Model 2171B / 2170B

Antenna Positioning Tower

User Manual

Model 2171B boresight

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An ESCO Technologies Company

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Revision Record

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Revision	Description	Date
A	Initial Release	December, 2013
B	Updated *Boom Load Limitations* illustration	March, 2014
C	Updated *Recommended Tools*, *Assembly Instructions*, *Air Polarization Operation*; added *Connecting Air Lines*	January, 2015
D	Updated bore sight link configurations; updated drawings in back of manual	June, 2015

Table of Contents

Notes, Cautions, and Warnings vii

1.0 Introduction 9

ETS-Lindgren Patented Boresight System 9

Boresight Function (2171B Only) 10

Non-Boresight Function 10

Positioning Controller (Required) 11

Standard Configuration 11

Tower Assembly 11

Variable Speed Motor 11

Links 11

Boresight with Centerline Pneumatic Polarization 11

Infrared (IR) Remote Controller 11

Fiber Optic Control Cables 11

Fiber Optic Shield Room Penetration Kit 11

Optional Items 12

Offset Boom 12

Additional Fiber Optic Cable 12

ETS-Lindgren Product Information Bulletin 12

2.0 Maintenance 13

Air Cylinder Maintenance 13

Maintenance Schedule 14

Every Three Months 14

Every Six Months 14

Every Twelve Months 14

Replacement and Optional Parts 14

Service Procedures 15

Contacting ETS-Lindgren 15

Sending a Component for Service 15

Calibration Services and Annual Calibration 15

3.0 Specifications 17

Electrical Specifications 17

Physical Specifications 17

4.0 Electrical Installation 19

Wire Gauge 19

Power Cord 19
Connecting the Positioning Controller 20
EMCenter RF Modular Platform 20
Model 2090 Multi-Device Controller 20
5.0 Assembly Instructions 21
Included and Recommended Tools 22
Included Tools 22
Recommended Tools 22
Parts to Assemble 22
Overview of Assembly Steps 23
Orientation of Parts during Assembly 24
Mast Orientation 24
Carrier Orientation 24
Base Orientation 25
Assembly Steps 26
Step 1—Remove Carrier from Temporary Shipping Mast 26
Step 2—Remove Temporary Shipping Mast from Base 27
Step 3—Slide Carrier onto (Main) Mast 28
Step 4—Begin Belt Installation 29
Step 5—Insert Mast into Base 32
Step 6—Connect Fiber Optic Cables 33
Step 7—Adjust the Timing 35
Step 8—Finish Installing the Belt 37
Step 9—Adjust Belt Tension 42
6.0 Additional Installation and Adjustments 43
Install Cable Antenna 43
Attach Optional Offset Boom 44
Install Boresight Links and Level Carrier (2171B Only) 46
Install Boresight Links 47
Level Carrier 48
Install Non-Boresight Links and Level Carrier (2171B Only) 49
Install Non-Boresight Links 49
Level Carrier 49
7.0 Operation 51
Pre-Operational Checklist 51
Air Polarization Operation 52

Connecting Air Lines 53
Infrared Remote Controller 54
Model 2090 Multi-Device Controller 54
Edit Configuration Parameters 55
Tower Encoder Calibration 56
Start-Up 57
Shutdown 57
Mounting Antennas 57
Boom Load Limitations 58
Appendix A: Warranty 59
Appendix B: EC Declaration of Conformity 61
Appendix C: Drawings 63
118100: Model 2171B Carrier Assembly (2 Pages) 63
118200: Model 2171B Tower Assembly 63
118623: Model 2170B Carrier Assembly 63
118624: Model 2170B Tower Assembly 63

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Notes, Cautions, and Warnings

Note: Denotes helpful information intended to provide tips for better use of the product.

CAUTION: Denotes a hazard. Failure to follow instructions could result in minor personal injury and/or property damage. Included text gives proper procedures.

WARNING: Denotes a hazard. Failure to follow instructions could result in SEVERE personal injury and/or property damage. Included text gives proper procedures.

Note: See the ETS-Lindgren *Product Information Bulletin* for safety, regulatory, and other product marking information.

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1.0 Introduction

The **ETS-Lindgren Model 2171B/2170B Antenna Positioning Tower** meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the equipment under test (EUT) while the antenna ascends and descends the mast. This is especially useful when high gain directional antennas are used.

The Model 2171B easily adjusts for non-boresight testing and for 3-m, 5-m, and 10-m boresight testing.

The Model 2171B/2170B is constructed as a single-piece mast of high density fiberglass-reinforced polymer square tubing. This material has a high degree of immunity from extended exposure to sunlight. The Model 2171B/2170B is also designed with a reduced base for easier maneuverability in smaller chambers.

A toothed belt drive provides smooth ascent and descent of the carrier assembly. The belt is an industrial grade composite that was selected for strength and longevity.

Model 2171B boresight (antenna not included)

The Model 2171B/2170B features variable speed operation with speed rates that range from 3 cm/sec to 22 cm/sec, as controlled by an ETS-Lindgren positioning controller. For more information on the positioning controller, see page 11.

The Model 2171B/2170B accepts stinger and other standard ETS-Lindgren antenna mounts. See *Mounting Antennas* on page 57 for more information.

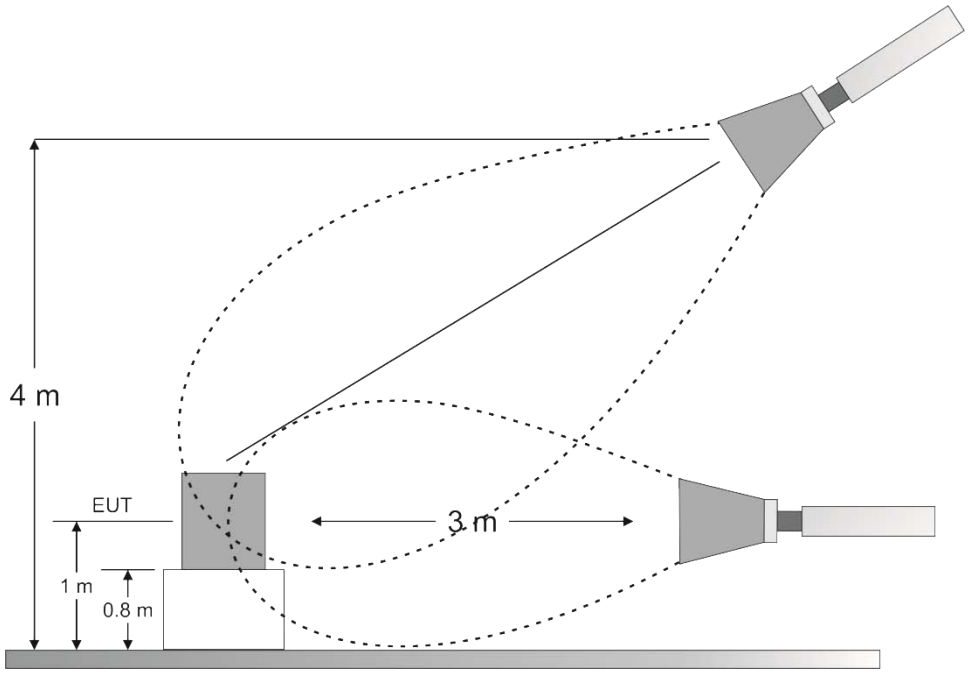
ETS-Lindgren Patented Boresight System

The Model 2171B provides the ETS-Lindgren patented boresight system to provide direct antenna aim on EUT during scanning. This boresight meets the requirements of ANSI C63.4 2003 and 2009 for compliance with FCC measurements above 1 GHz.

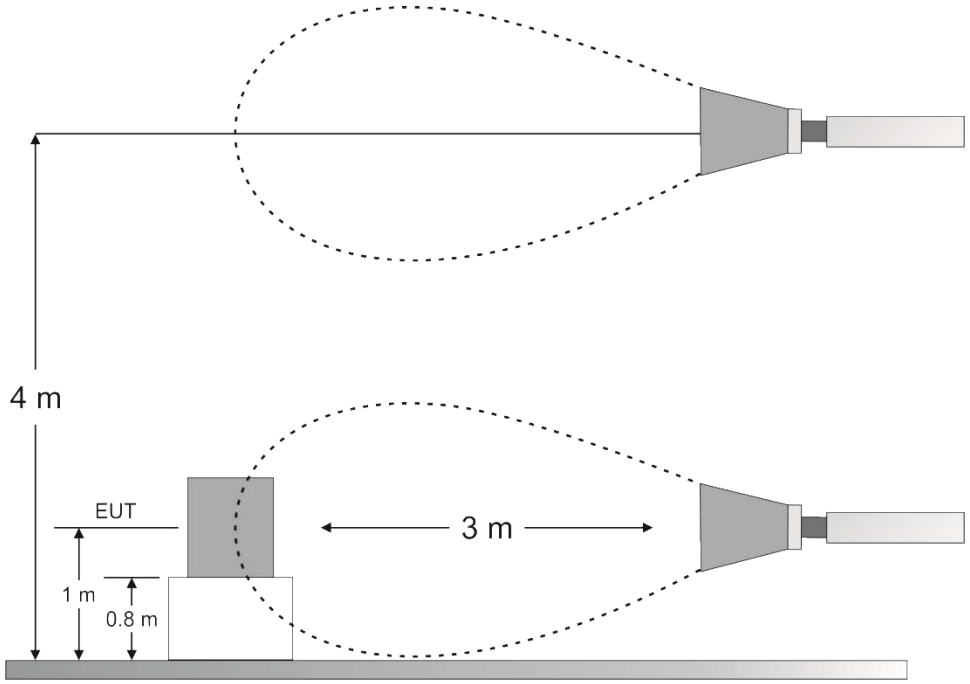
During scans, the boresight system maintains constant directional antenna positioning while varying the angle between the antenna and the mast. This is particularly important when using higher gain antennas of more than 3 dBi. As the antenna is raised above the ground, the tilt of the antenna will maintain the EUT within the half power (-3 dB) beamwidth.

Note: The following drawings use a generic positioning tower to illustrate boresight and non-boresight function.

BORESIGHT FUNCTION (2171B ONLY)



NON-BORESIGHT FUNCTION



Positioning Controller (Required)

A positioning controller, such as the ETS-Lindgren EMCenter™ Modular RF Platform (with EMControl™ Positioner Controller Plug-In Card) or Model 2090 Multi-Device Controller, is required for operation, and is sold separately. Contact ETS-Lindgren for ordering information.

Note: Existing ETS-Lindgren positioning controllers can be used with the Model 2171B/2170B; contact ETS-Lindgren to confirm your controller is installed with the required firmware. The Model 2090 requires firmware revision 3.21 or higher.

Standard Configuration

TOWER ASSEMBLY	Single-piece mast, castered base, carrier assembly
VARIABLE SPEED MOTOR	
LINKS	Non-boresight and 3-, 5-, and 10-meter for boresight
BORESIGHT WITH CENTERLINE PNEUMATIC POLARIZATION	With adjustable rotational velocity
INFRARED (IR) REMOTE CONTROLLER	See page 51
FIBER OPTIC CONTROL CABLES	3- and 10-meter
FIBER OPTIC SHIELD ROOM PENETRATION KIT	Routes the fiber optic control cable from the control room to the shield room while maintaining shielding attenuation. The pieces are made of brass for conductivity and provide attenuation of greater than 100 dB at 10 GHz. A single 25-mm (1.0-in) hole is required for mounting.

Optional Items

OFFSET BOOM

An optional offset boom is available (part# 118617). Contact ETS-Lindgren Sales Department for more information.

ADDITIONAL FIBER OPTIC CABLE

Various lengths of fiber optic cable are available by custom order. The standard length provided is 10 m (32.8 ft).

ETS-Lindgren Product Information Bulletin

See the ETS-Lindgren *Product Information Bulletin* included with your shipment for the following:

- Warranty information
- Safety, regulatory, and other product marking information
- Steps to receive your shipment
- Steps to return a component for service
- ETS Lindgren calibration service
- ETS Lindgren contact information

2.0 Maintenance

CAUTION: Before performing any maintenance, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

WARNING: Maintenance of Model 2171B/2170B is limited to the instructions provided here. If you have any questions concerning maintenance, contact ETS-Lindgren Customer Service.

Do not make any modifications to this unit without consulting the factory directly.

Only use replacement parts and fasteners ordered directly from the factory.

This equipment should be operated and maintained by qualified personnel.

Disconnect all air supply lines when servicing pneumatic components.

Service equipment in accordance with the maintenance schedule provided.

Periodically check belt for wear.

Air Cylinder Maintenance

The air cylinder uses a special O-ring lubricant: silicon grease designed specifically for O-rings. During maintenance apply this type of silicon grease to prevent excessive wear of the O-rings.

Maintenance Schedule

EVERY THREE MONTHS

- Inspect belt for wear, tension, and cracking.
- Check all screws and bolts to confirm that are tight per assembly instructions.
- Inspect bolts and hardware for breakage.

EVERY SIX MONTHS

- Check connecting control and all cables for degradation from environment and use. If necessary, replace per safety per local electrical codes.

EVERY TWELVE MONTHS

- Use high-grade silicone grease on all carrier rollers.

Replacement and Optional Parts

Note: ETS-Lindgren may substitute a similar part or new part number with the same functionality for another part/part number. Contact ETS-Lindgren for questions about part numbers and ordering parts.

Following are the part numbers for ordering replacement or optional parts for the Model 2171B/2170B.

Part Description	Part Number
Boresight links	
3-meter link	119612
5-meter links	119613 (LH), 119665 (RH)
10-meter links	119614 (LH), 119666 (RH)
Non-boresight link	
1 1/2-in link	118050
1-in link	118051
Cam knob	118052
Cam lock knob	118059
Offset boom, 2171B/2170B	118617
Timing Belt (33 ft required)	880393
Fuse, 5 x 20mm 3A Slow	480029

CONTACTING ETS-LINDGREN

Note: Please see www.ets-lindgren.com for a list of ETS-Lindgren offices, including phone and email contact information.

SENDING A COMPONENT FOR SERVICE

For the steps to return a system or system component to ETS-Lindgren for service, see the *Product Information Bulletin* included with your shipment.

CALIBRATION SERVICES AND ANNUAL CALIBRATION

See the *Product Information Bulletin* included with your shipment for information on ETS-Lindgren calibration services.

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3.0 Specifications

Electrical Specifications

Voltage:	220 VAC
Amp:	5.0
Line Frequency:	50/60 Hz
Phase:	Single

Physical Specifications

Polarization:	30° per second
Scan Range:	1.0 m—4.0 m (39.37 in—157.48 in)
Speed Range:	3 cm/sec to 22 cm/sec
Cross-Boom Loading:	10.4 kg (23.0 lb)
Separation Distance (boresight):	3 m, 5 m, 10 m
Weight (approximate):	80 kg (175.0 lb)
Maximum Overall Height:	**2171B:** 4.9 m (193 in) **2170B:** 4.2 m (165 in)
Base Dimensions (LxW):	1.2 m (47.5 in) x 0.8 m (34.0 in)

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4.0 Electrical Installation

CAUTION: Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

Electrical installation must be performed by a qualified electrician, and in accordance with local and national electrical standards.

Make sure the power is off and secured before proceeding.

Wire Gauge

Whenever possible the motor should be powered from a separate branch circuit of adequate capacity to keep voltage drop to a minimum during startup and running. For longer runs, increase the wire size in accordance with the following wire selection guide.

Note: Never use smaller than 14 AWG for any installation.

Length of Wire @ 220 V:	0-15.24 m (0-50 ft)	15.24-30.48 m (50-100 ft)	30.48-60.96 m (100-200 ft)
Wire Gauge Required:	14 AWG	14 AWG	14 AWG

Power Cord

The motor base is provided with an input AC power cord that is approximately 2.45 m (8 ft) long. This power cord is suitable for portable or indoor applications without modification.

EMCenter RF Modular Platform

The ETS-Lindgren EMCenter™ Modular RF Platform (with EMControl™ Positioner Controller Plug-In Card) may be used to control the Model 2171B/2170B Antenna Positioning Tower. For information on connecting and using the EMCenter, see the *EMCenter Modular RF Platform User Manual*.

Model 2090 Multi-Device Controller

Any combination of primary devices (towers, turntables, reverberation paddles, MAPS, and so on) can be connected to the two device interface ports located on the rear panel of the Model 2090 Series Multi-Device Controller. For easy setup of an EMC facility, it is recommended that the Model 2171B/2170B Antenna Positioning Tower be connected to the **Device 1** port. The default settings are for a tower connected to the **Device 1** port and a turntable connected to the **Device 2** port.

Primary device connection is accomplished with a dual fiber optic cable included with the device. This cable terminates into two ST connectors that are identical at both ends. The cable is symmetrical, so either end can be connected to the Model 2090. A fiber optic cable connected to the IN port of a device should be connected to the primary OUT port of the motor base at the other end. Similarly, a fiber optic cable connected to the OUT port of the device should be connected to the primary IN port of the motor base at the other end. Older motor base designs have only one fiber optic connector pair, but the newer motor base interface provides a secondary interface reserved for future expansion.

CAUTION: Fiber optic cabling for each device should not hang unsupported from the rear panel of the Model 2090. The fibers and connectors are easily broken if twisted or bent. Keep the fiber optic cables as straight as possible from the connector to the protective sheath.

5.0 Assembly Instructions

CAUTION: Before connecting any components, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

This equipment should be installed, operated, and maintained by qualified personnel.

Stay clear of all moving components on this equipment.

Never stand beneath the carrier, whether moving or stationary.

Note: You will require assistance from two or more team members to assemble the Model 2171B/2170B.

Note: See the ETS-Lindgren *Product Information Bulletin* included with your shipment for information on unpacking and acceptance procedures**.**

The Model 2171B/2170B Antenna Positioning Tower should be assembled in the location where it will be used. If movement to another location is required after assembly, partial disassembly will be required for it to fit through most doorways.

Included and Recommended Tools

INCLUDED TOOLS

- **Part# 891780:** Adjustable Wrench, 1-1/8” Jaw (quantity: 2). For all hex nuts.
- **Part# 891781:** Hex L-Key, 3/16” Hex (quantity: 1). For cam rollers on motor base.
- **Part# 120927:** Fiber Optic Connector Tool (quantity: 1). For fiber optic connection on mast.

RECOMMENDED TOOLS

- Work bench or two sawhorses
- Medium-sized level

Parts to Assemble

These main parts are used to assemble the Model 2171B/2170B:

- Mast
- Carrier
- Belt
- Base

Boresight shown; antenna not included

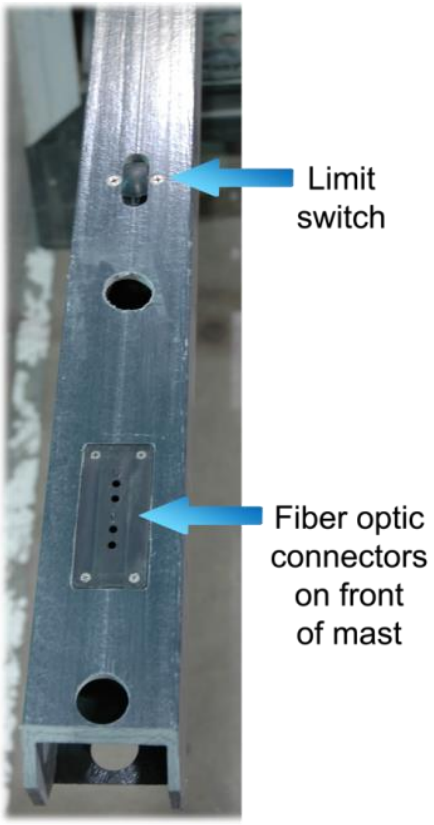
Note: The Model 2171B/2170B ships with a small temporary shipping mast. The carrier is installed on this small mast and then inserted into the base for stability during transit. The temporary shipping mast should never be used for operation.

Overview of Assembly Steps

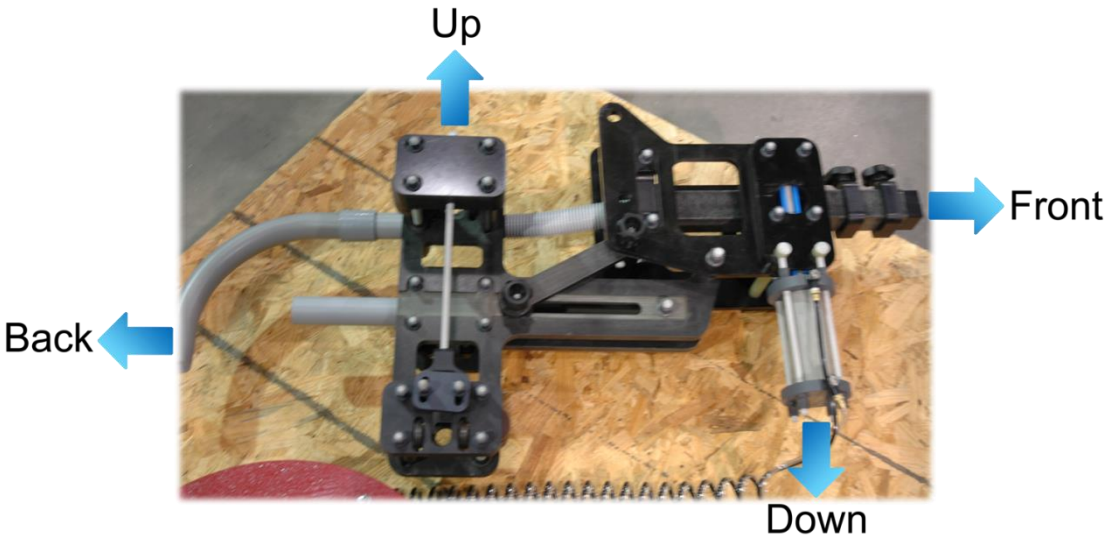
1. Remove carrier from temporary shipping mast—see page 26.
2. Remove temporary shipping mast from base—see page 27.
3. Slide carrier onto (main) mast—see page 28.
4. Begin belt installation—see page 29.
5. Insert mast into base—see page 32.
6. Connect fiber optic cables—see page 33.
7. Adjust the timing—see page 35.
8. Finish installing the belt—see page 37.
9. Adjust belt tension—see page 42.

MAST ORIENTATION

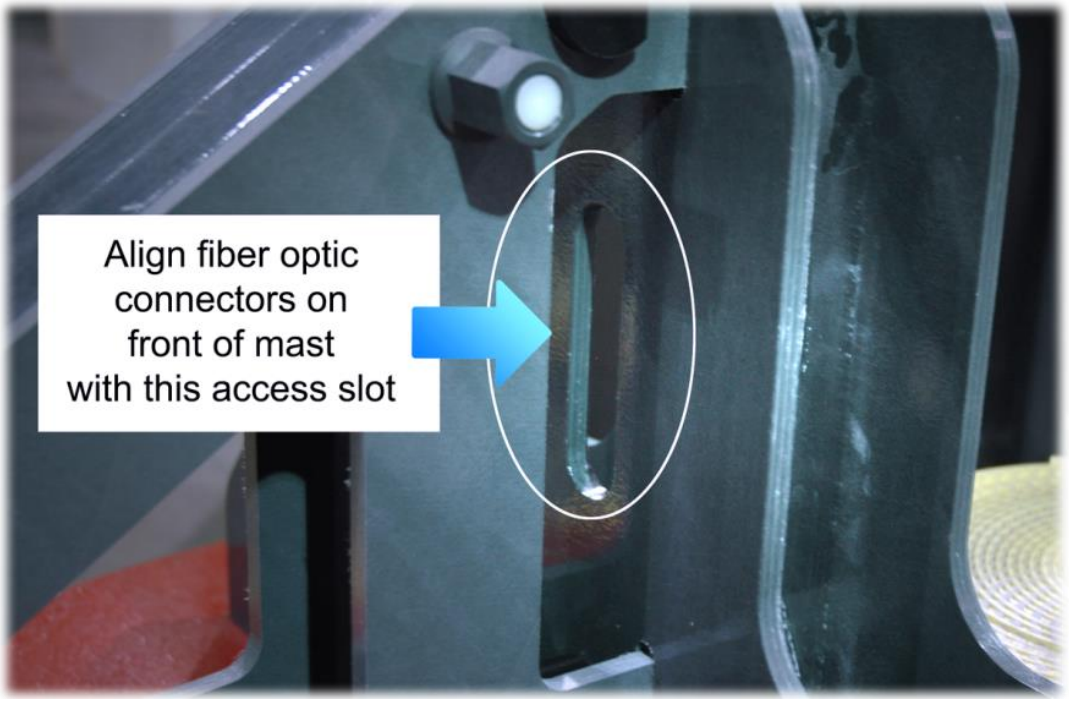
The fiber optic connectors are located on the front of the mast.



CARRIER ORIENTATION



BASE ORIENTATION



CAUTION: TAKE CARE TO AVOID DAMAGE TO FIBER OPTIC CABLES: Never pull, pinch, bend, twist, or place any kind of stress on the fiber optic cables.

STEP 1—REMOVE CARRIER FROM TEMPORARY SHIPPING MAST

With the base on the floor and the temporary shipping mast in a vertical position, carefully lift the carrier straight up, sliding it off of and away from the temporary shipping mast.

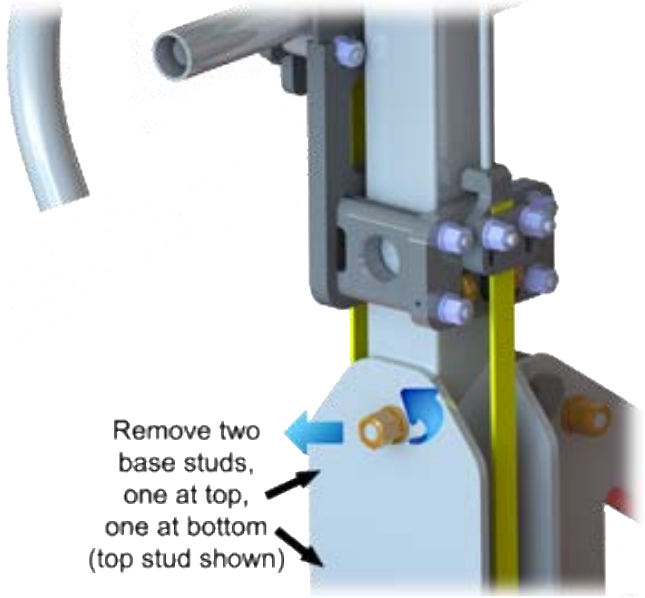
STEP 2—REMOVE TEMPORARY SHIPPING MAST FROM BASE

Note: Never use the temporary shipping mast for operation.

In the following view the carrier and belt are shown, but only the mast is present during this step.

Remove the two base studs by rotating and then pulling straight out.

Lift up to remove the temporary shipping mast from the base.



Note: Make sure to orient the carrier and mast as shown in *Orientation During Assembly* on page 24.

STEP 3—SLIDE CARRIER ONTO (MAIN) MAST

Place the mast horizontally onto an elevated, stable surface, such as across two sawhorses.

Carefully slide the carrier onto the mast from the bottom of the mast. Orient the carrier so that when the mast is inserted into the base:

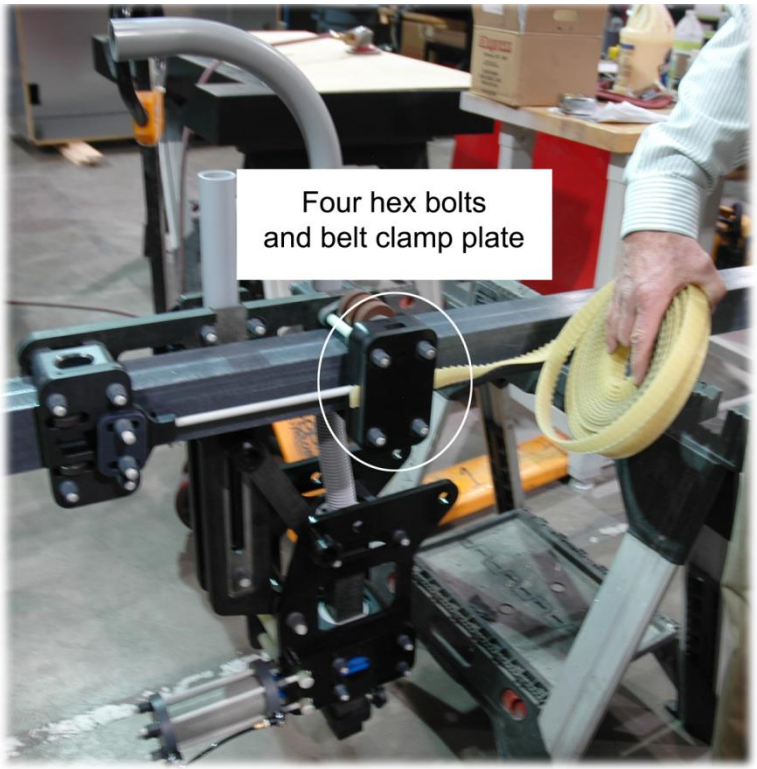
- The air cylinder is on the same side of the mast as the fiber optic connectors; and
- When the mast is upright, the air cylinder will point downward.

STEP 4—BEGIN BELT INSTALLATION

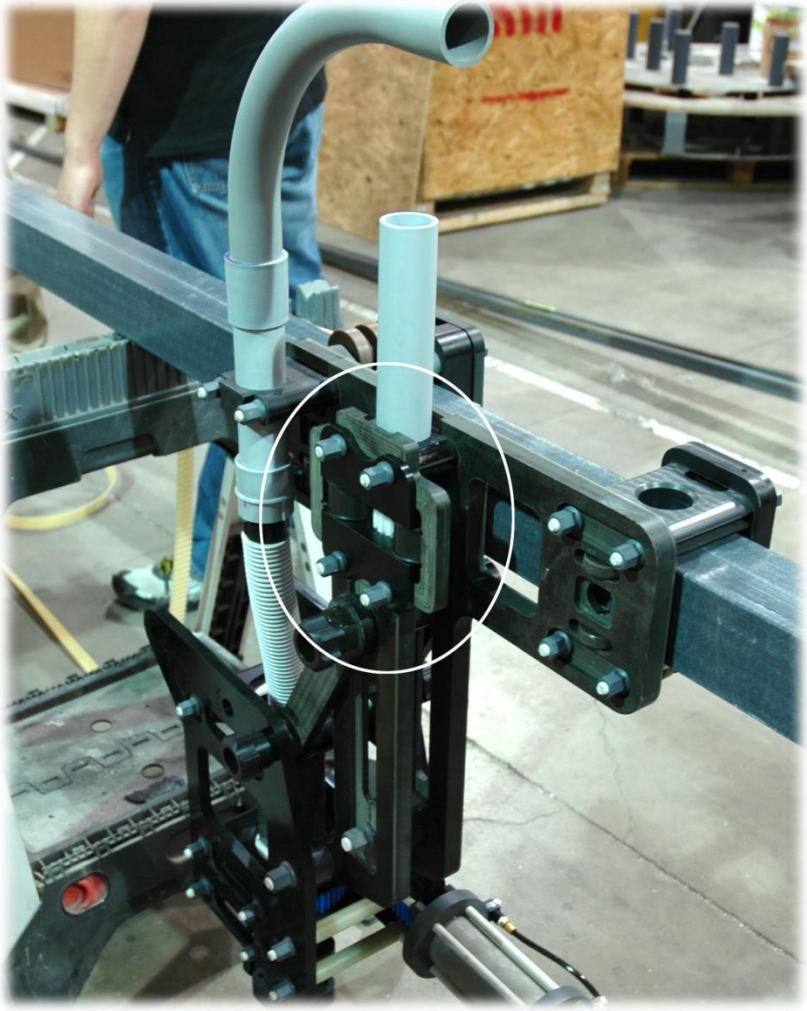
Remove the belt clamp plate by removing the four hex nuts.

With the teeth facing inward, place one end of the belt in the notch, and then replace the belt clamp plate and hex nuts.

Route the belt up the carrier, over the top of the mast, and then back down to the carrier.

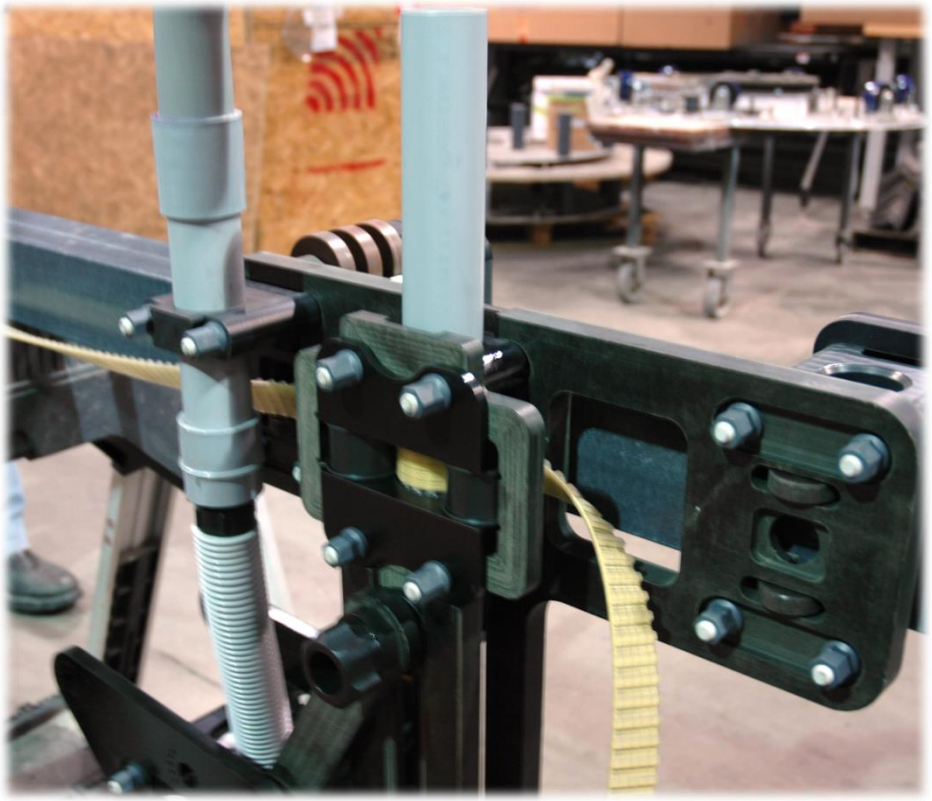


Route the belt to the top of the mast, over the pulleys,
and down the other side of the mast.



Remove the four hex nuts to remove the timing pulley plate.

Thread the belt over the timing pulley.



Replace the plate and four hex nuts to keep the belt in place
while you move the mast into a vertical position;
you will remove the plate and hex nuts again
to adjust the timing in step 7 on page 35.

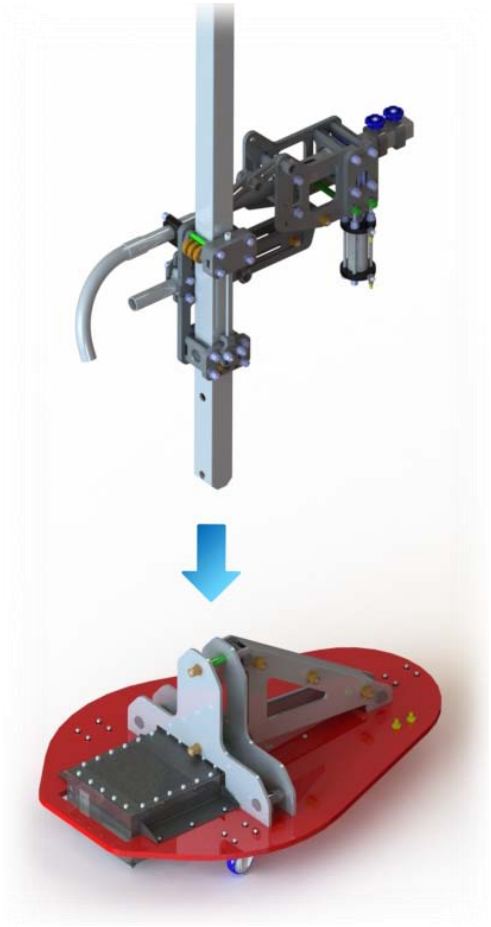
Note: Make sure to orient the carrier and mast as shown in *Orientation During Assembly* on page 24.

STEP 5—INSERT MAST INTO BASE

Carefully move the mast and carrier into a vertical position and slide the mast into the base, aligning the fiber optic connectors on the front of the mast with access slot on the front of the base.

Replace the two base studs removed in step 2 on page 27.

Adjust the carrier height by moving the carrier past the lower limit switch until it stops at rest on the top of the base.



CAUTION: TAKE CARE TO AVOID DAMAGE TO FIBER OPTIC CABLES: Never pull, pinch, bend, twist, or place any kind of stress on the fiber optic cables.

STEP 6—CONNECT FIBER OPTIC CABLES

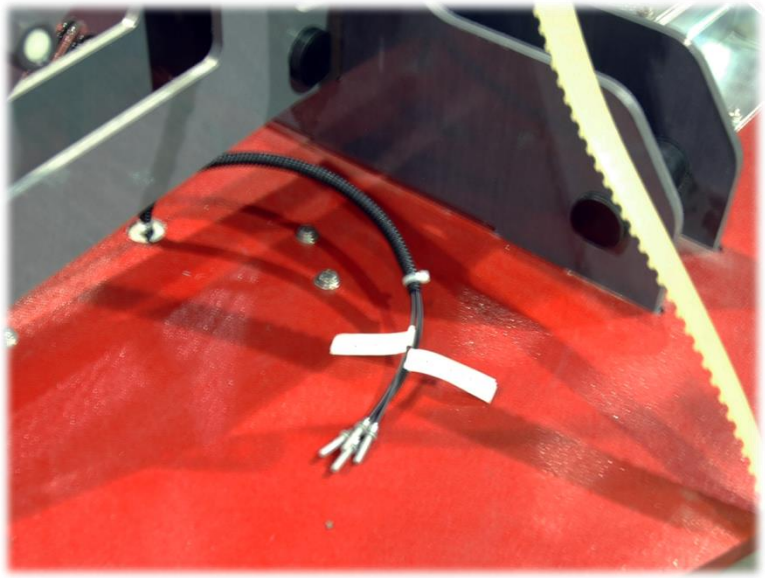
Carefully plug the fiber optic cables through the access slot on the front of the base and into the fiber optic connectors located on the front of the mast.

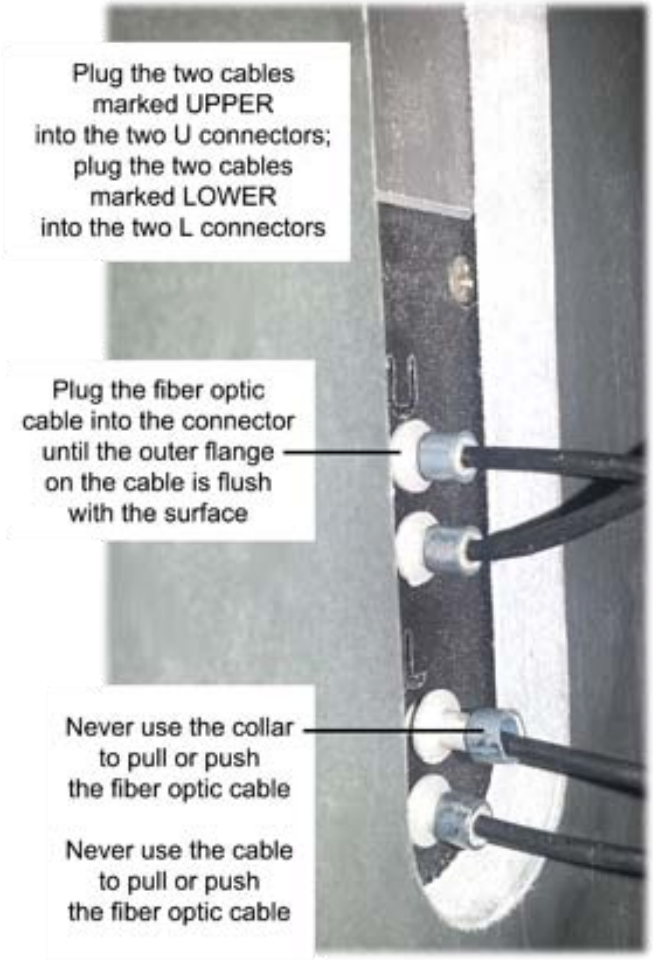
Two of the cables are marked **U** for the UPPER limit and two are marked **L** for the LOWER limit; plug the two cables marked **U** into the connectors marked **U** on the mast, and plug the two cables marked **L** into the connectors marked **L**.

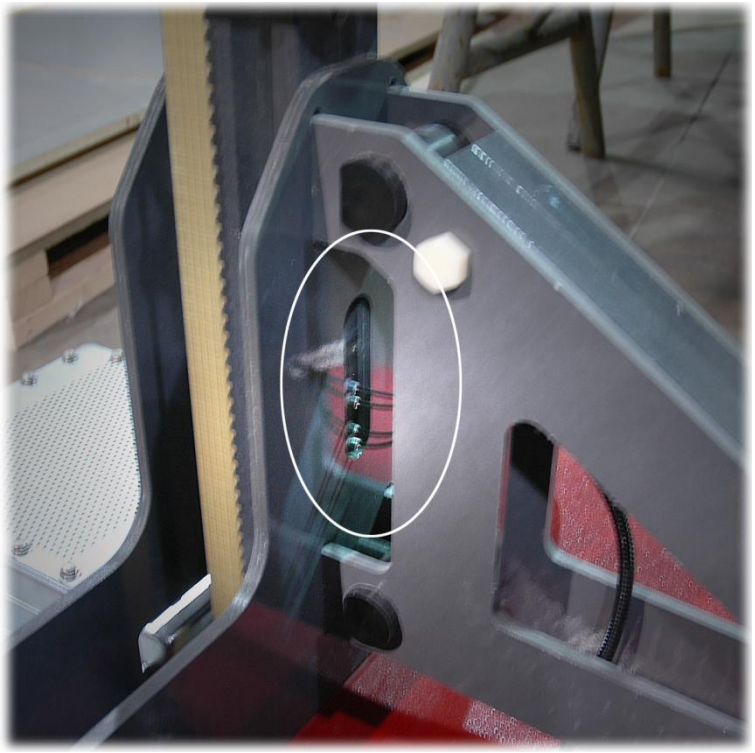
Either **U** cable can be plugged into either of the **U** connectors; either **L** cable can be plugged into either of the **L** connectors.

When completely plugged in, the outer flange on the cable should be flush with the surface of the mast.

Always use the flange on the cable to connect or disconnect the fiber optic cables; never pull or push the fiber optic cable using the collar or the cable.




Plug the two cables
marked UPPER
into the two U connectors;
plug the two cables
marked LOWER
into the two L connectors
Plug the fiber optic
cable into the connector
until the outer flange
on the cable is flush
with the surface
Never use the collar
to pull or push
the fiber optic cable
Never use the cable
to pull or push
the fiber optic cable

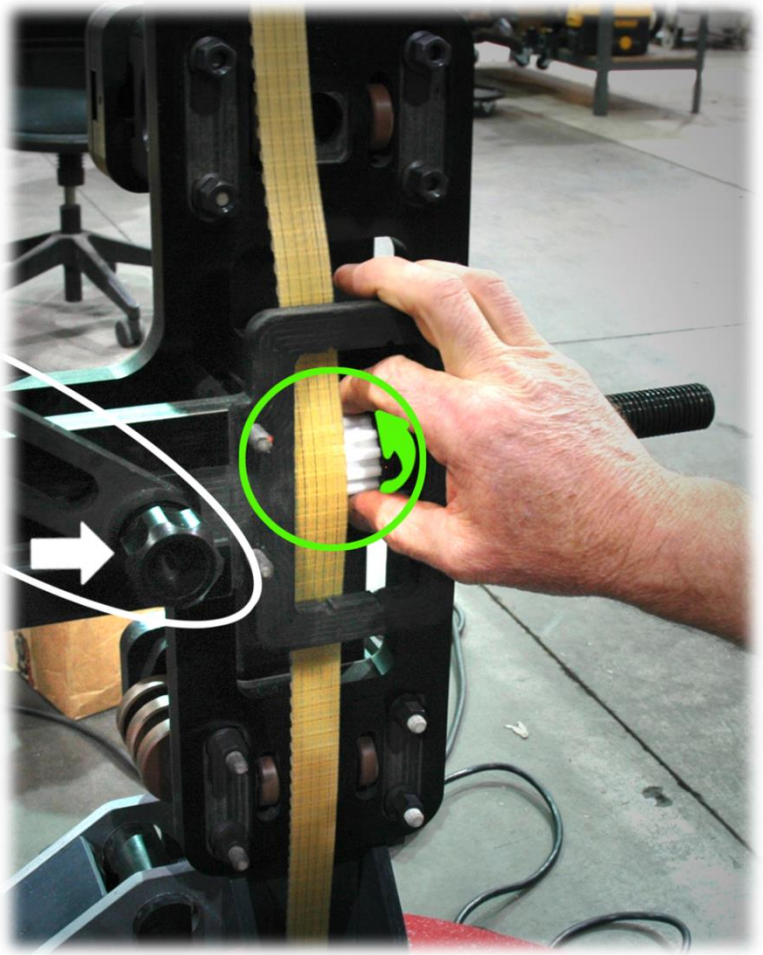


STEP 7—ADJUST THE TIMING

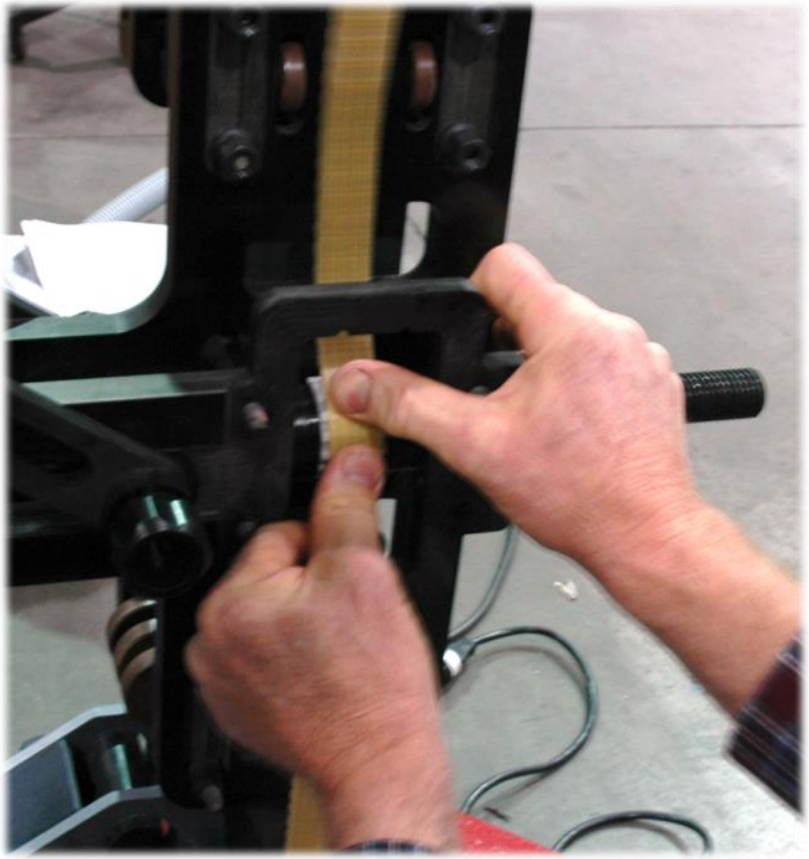
Remove the four hex nuts and the timing pulley plate.

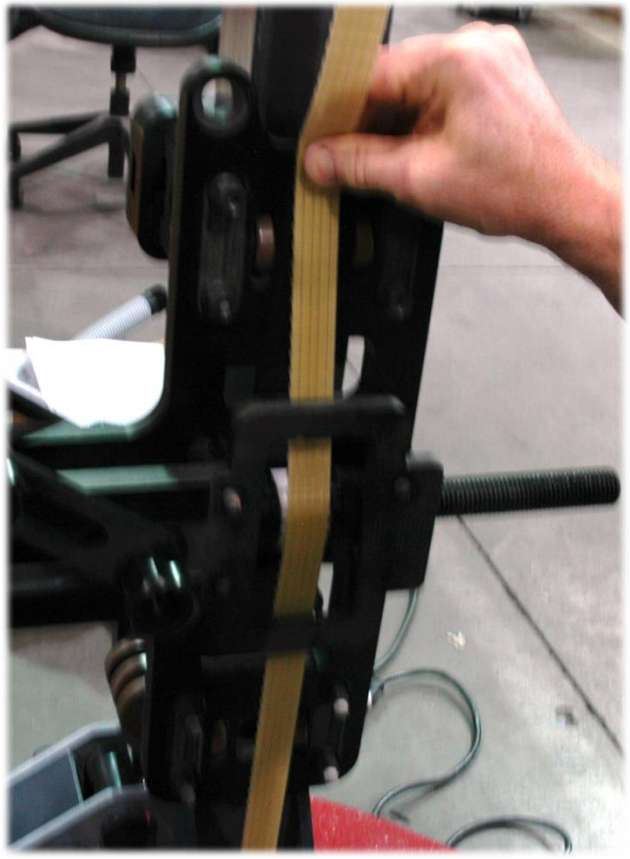
To adjust the timing between the boresight and the carrier:

- Manually rotate the timing pulley to move the cam link back toward the mast to the limit of its travel.



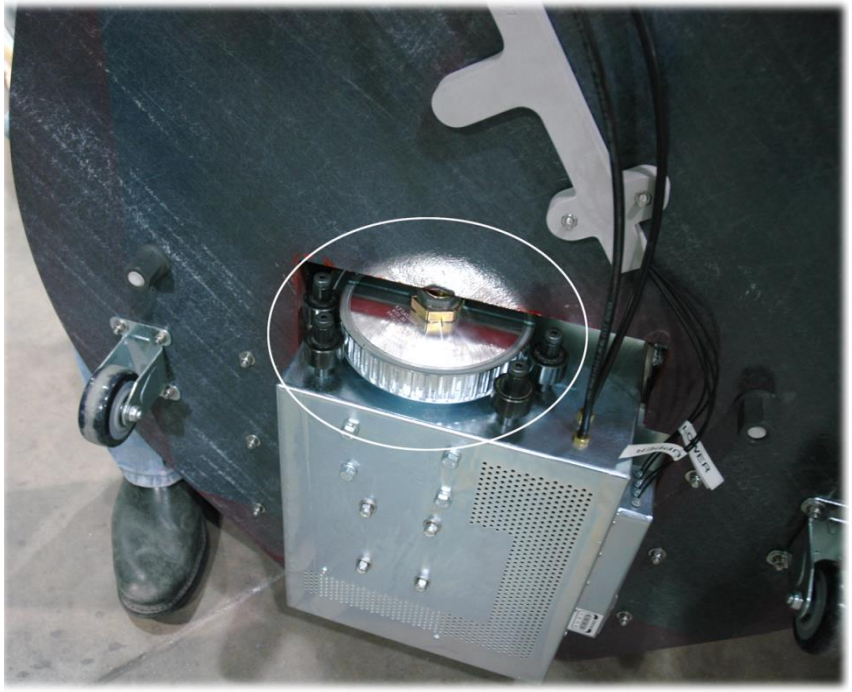
- Roll the pulley to engage the teeth and then pull the belt up, taking care to keep slack out of the lower section of belt between the motor base and the timing pulley.
- When done, replace the plate and four hex nuts.

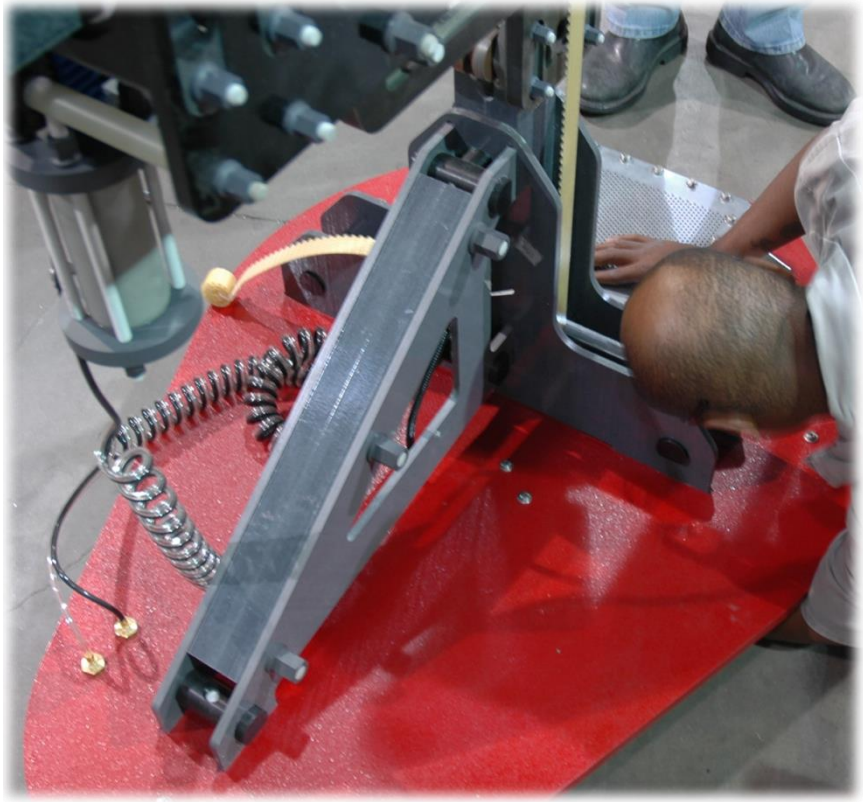




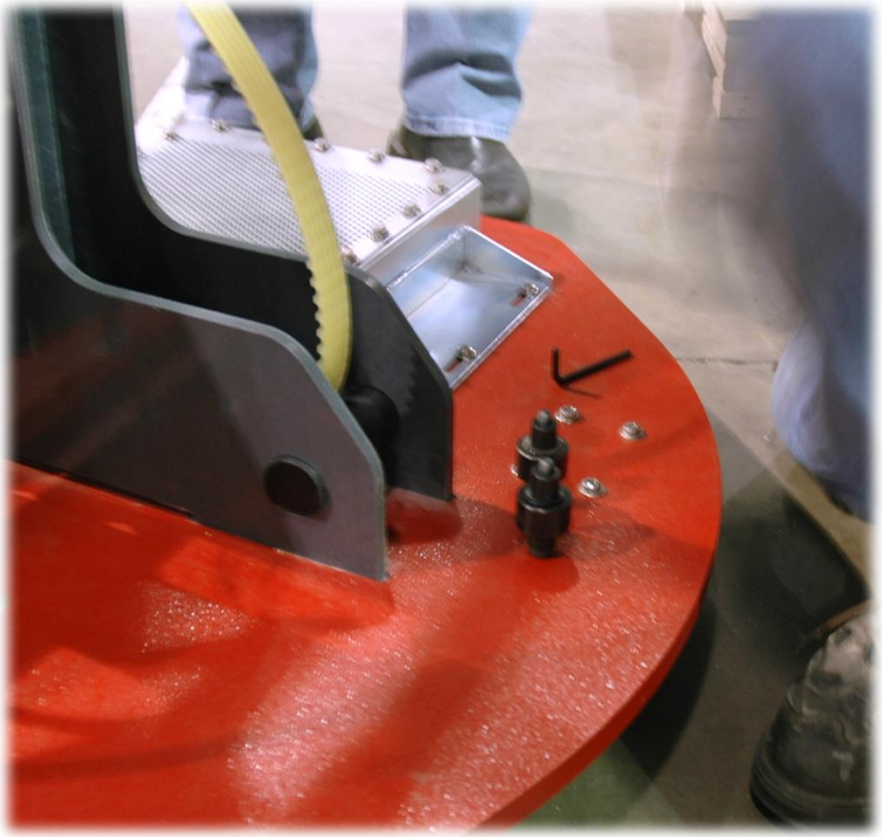
STEP 8—FINISH INSTALLING THE BELT

Four cam followers are located on the underside of the base next to motor base pulley.

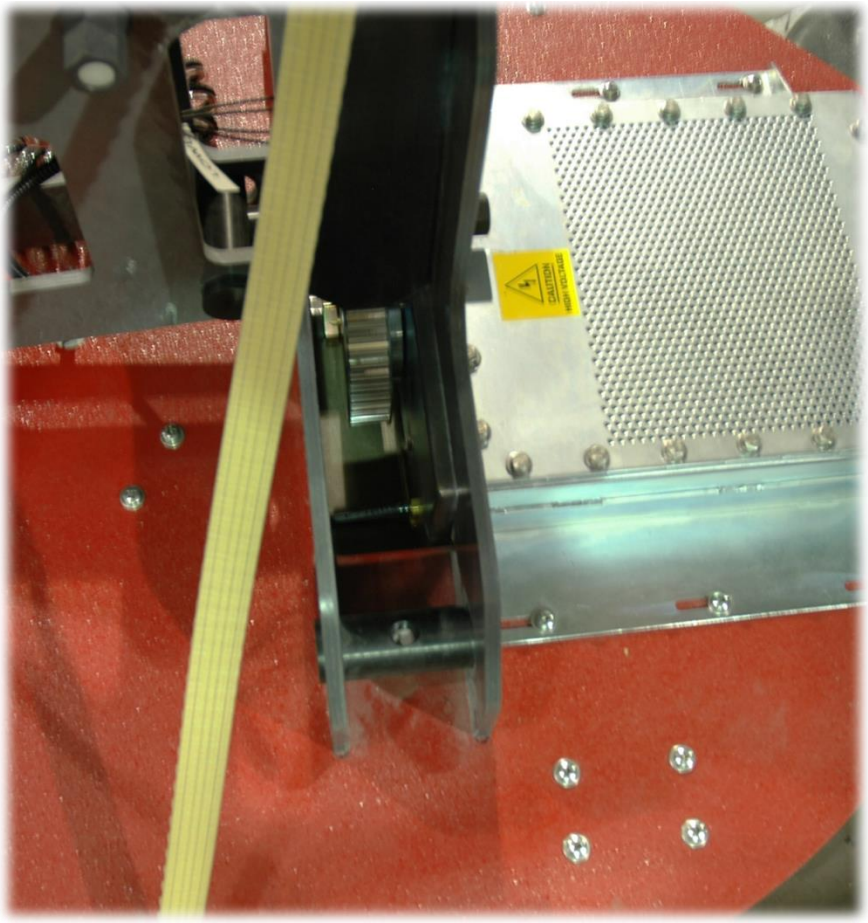




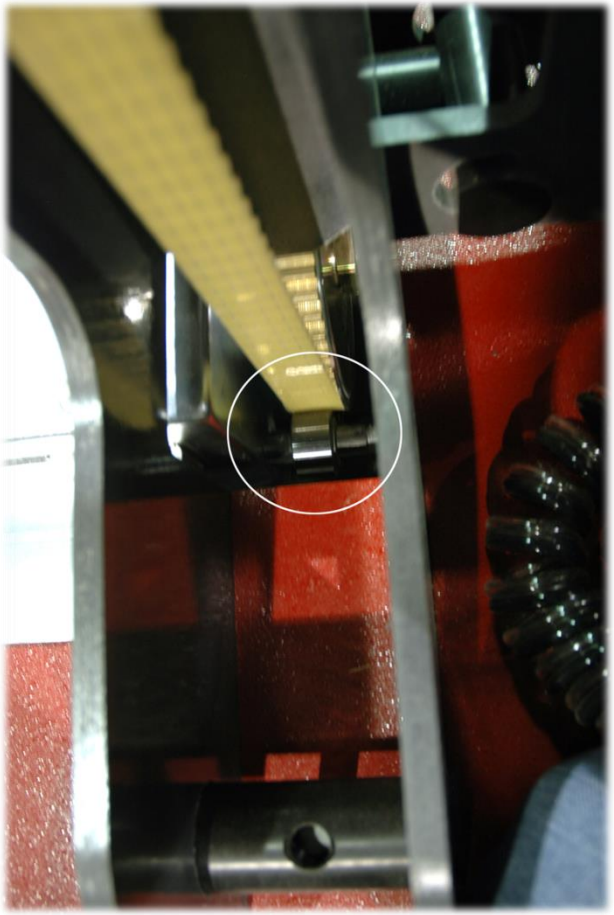
Reach under the base to access and remove the four cam followers with an Allen wrench.



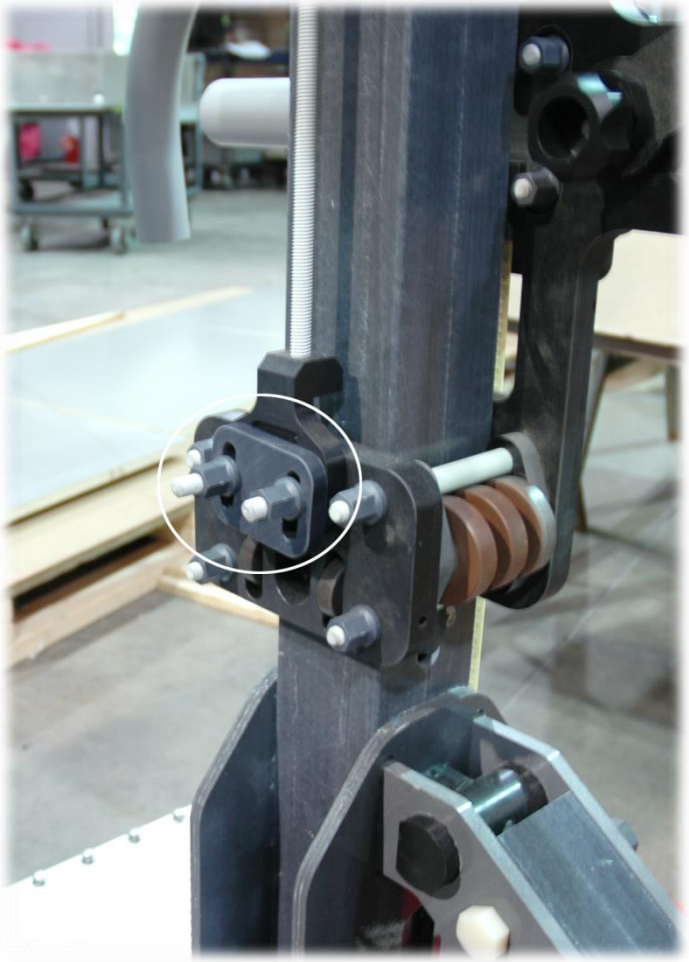
View of two cam followers removed.



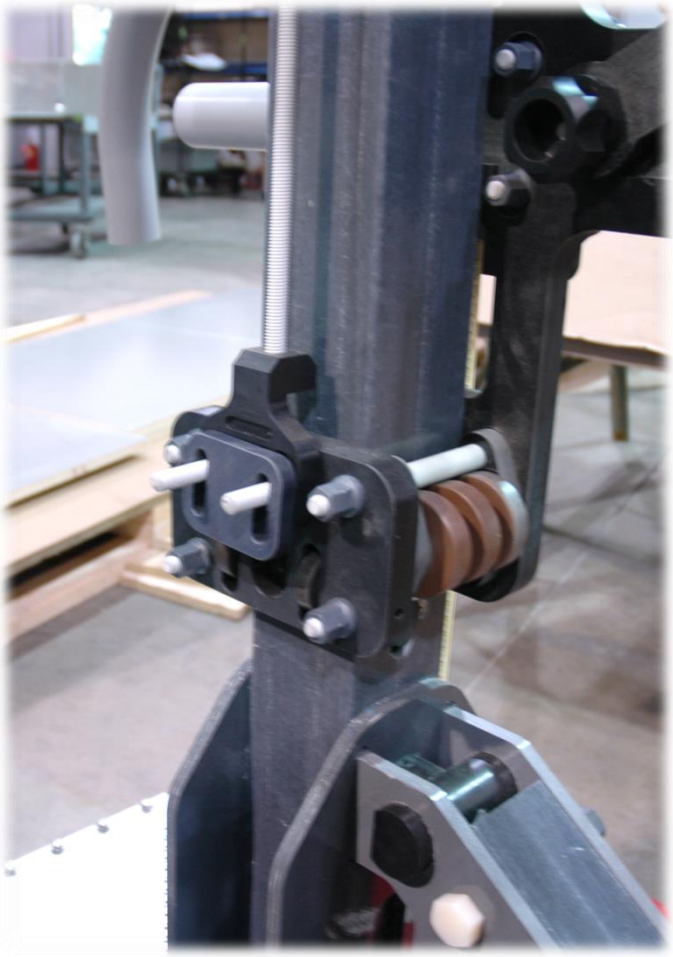
View of motor base pulley with cam followers removed.
With teeth facing inward, continue routing the belt down,
around the motor base pulley, and back up.



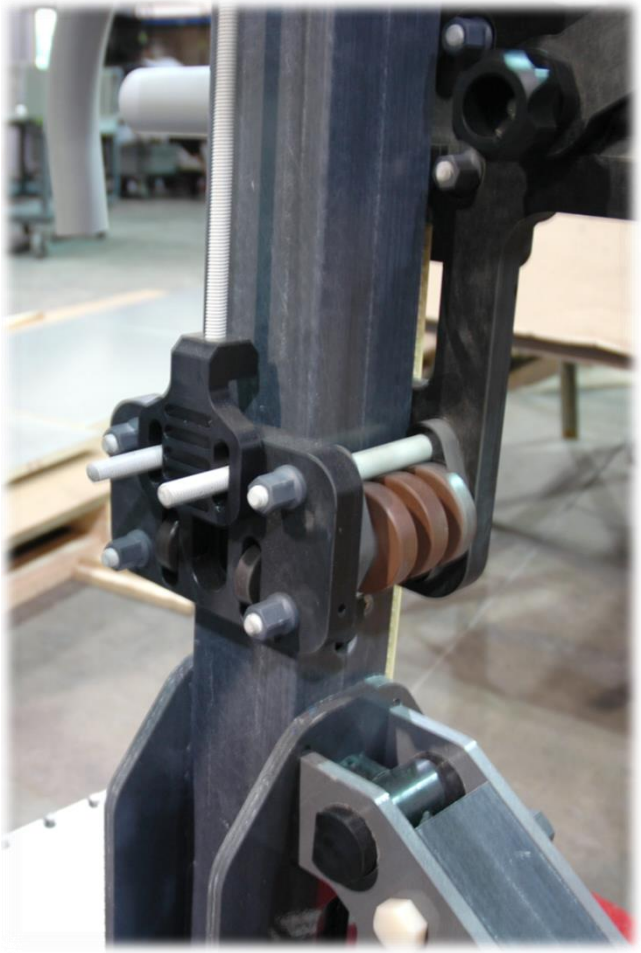
Replace the four cam followers and tighten with an Allen wrench.
View of motor base pulley with threaded belt
and re-installed cam followers.



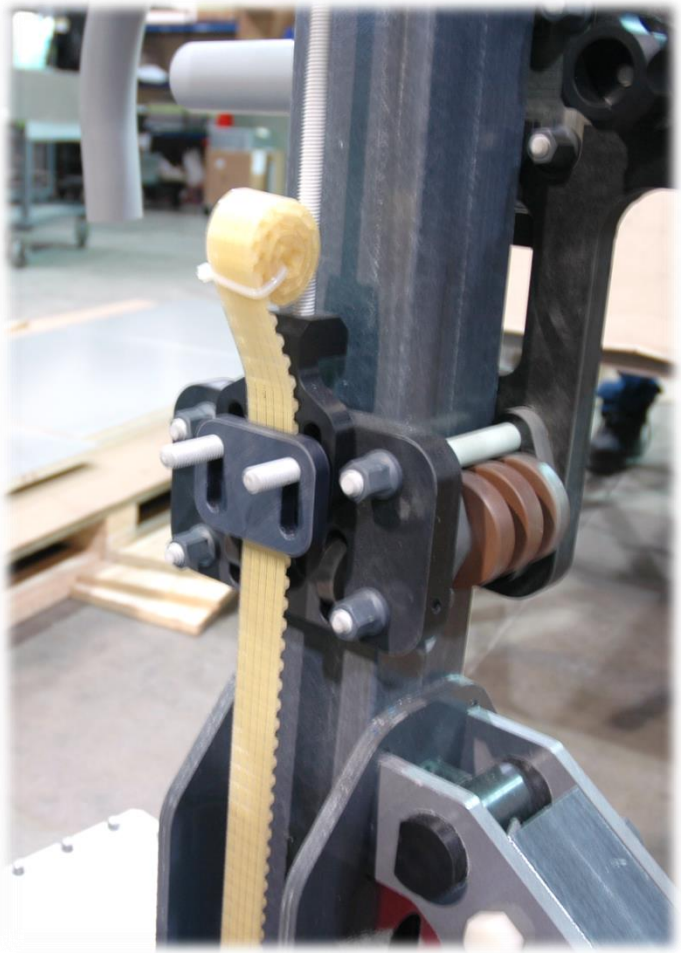
Finish installing the belt by attaching it to the lower belt clamp.
Remove the two hex nuts.



Remove small plate.



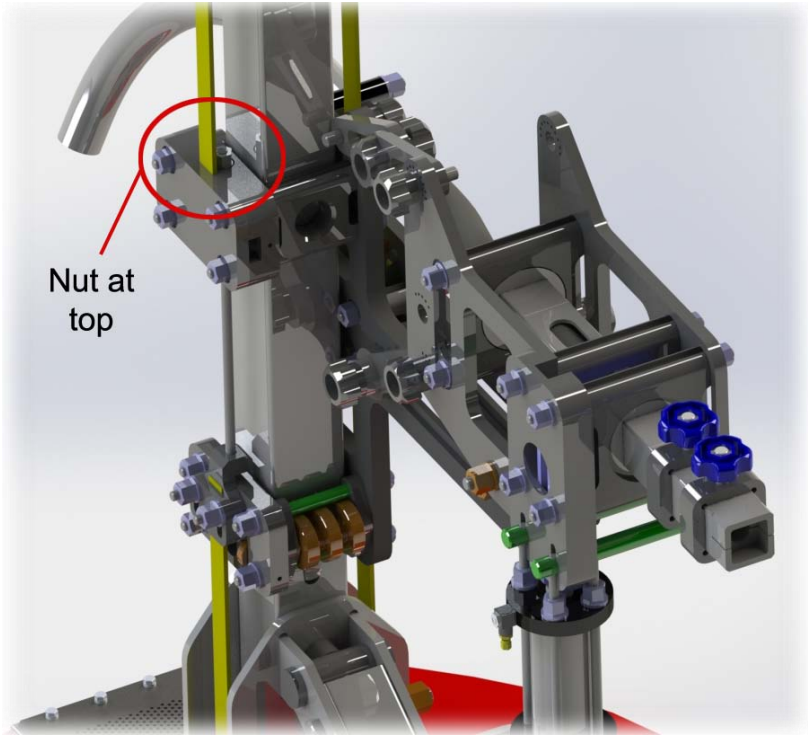
With the teeth facing inward, place the belt between the posts and in the lower belt clamp, and then all the slack out of the belt so that it is as taut as possible.



Replace the plate and two hex nuts.

STEP 9—ADJUST BELT TENSION

- Tighten nut located at top of upper belt clamp.
- Tension the belt until it is snug on the motor gear. Do not over-tension.



CAUTION: To prevent excess belt from getting caught in the carrier during operation, roll up the excess belt and tie it to the carrier.

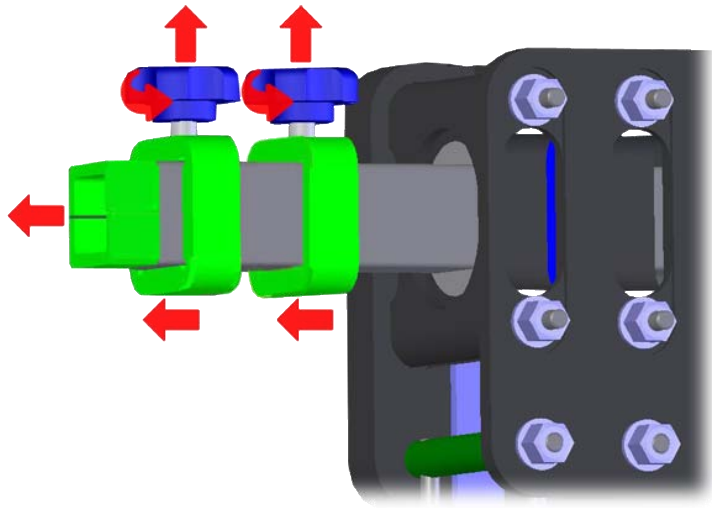
6.0 Additional Installation and Adjustments

Install Cable Antenna

1. Feed the antenna cable into the curved elbow fitting, through the middle hose, and out the slotted end of the boom.
2. Attach the end of the cable to the antenna.
3. Insert the stinger into the boom and tighten boom knobs to secure the antenna in place.

Attach Optional Offset Boom

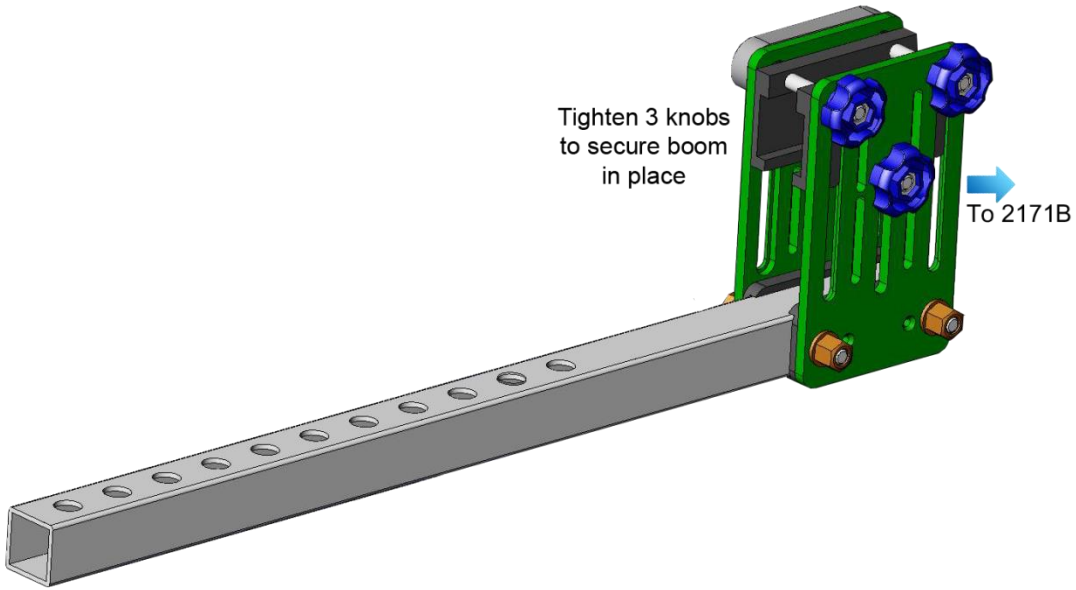
Note: The Model 2171B/2170B ships with a stinger-mount boom. If you ordered an optional offset boom (part# 118617), follow these steps to remove the stinger-mount boom and install the offset boom.

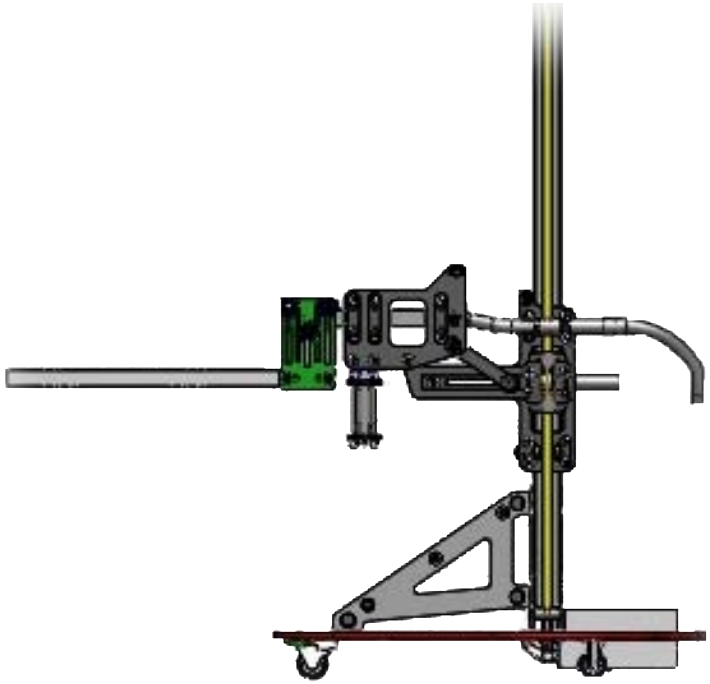


1. Rotate the two boom knobs to completely remove them.
2. Remove the stinger-mount and two clamps by sliding them off the boom.

3. Insert the offset boom into the end of the Model 2171B/2170B boom.

4. Tighten the three knobs on the offset boom to secure into place.





Install Boresight Links and Level Carrier (2171B Only)

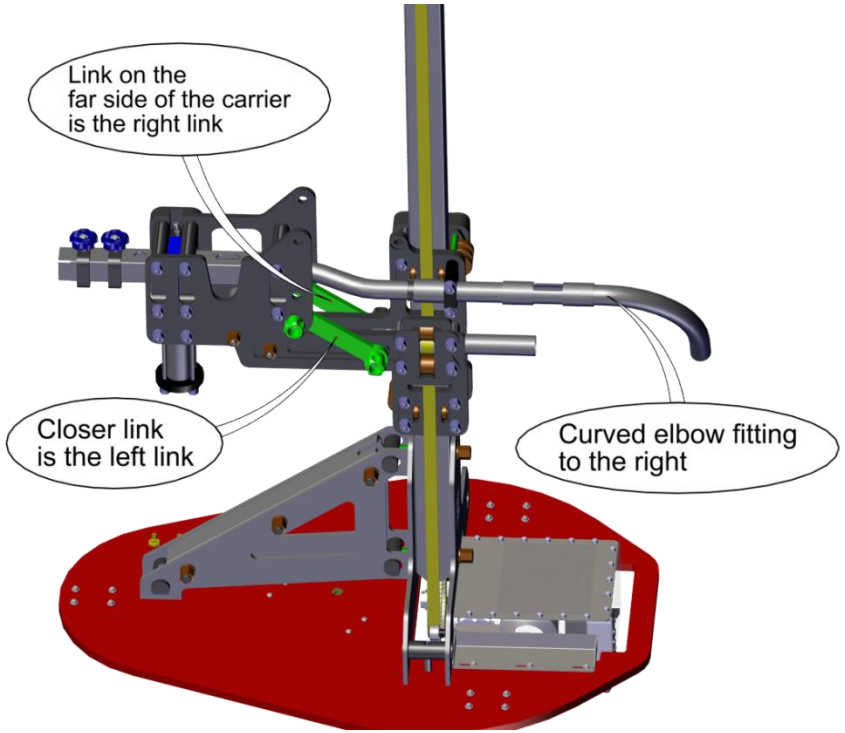
CAUTION: Install only one set of boresight links at a time. Never operate the Model 2171B with boresight and non-boresight links installed at the same time.

Note: The 3m uses one link; the 5m and the 10m use a set of two links (left and right). For part number information, see *Replacement and Optional Parts* on page 14.

Note: Make sure to install the 5m and 10m links in the correct location.

For orientation, face the Model 2171B with the curved elbow fitting extending to the right.

The left link is installed on the left side of the carrier, which is the closer side of the carrier; the right link is installed on the right side, which is the far side.

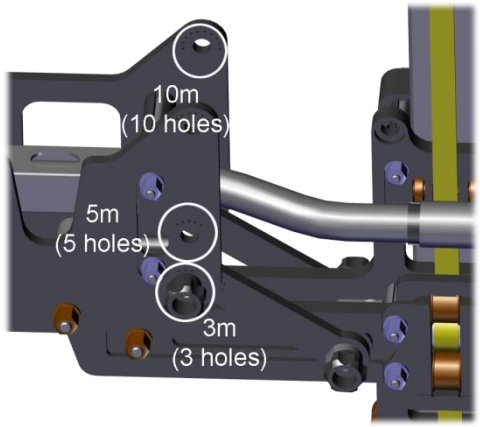


INSTALL BORESIGHT LINKS

Each boresight link is marked with a pattern of holes that identifies the type of testing it is used to perform.

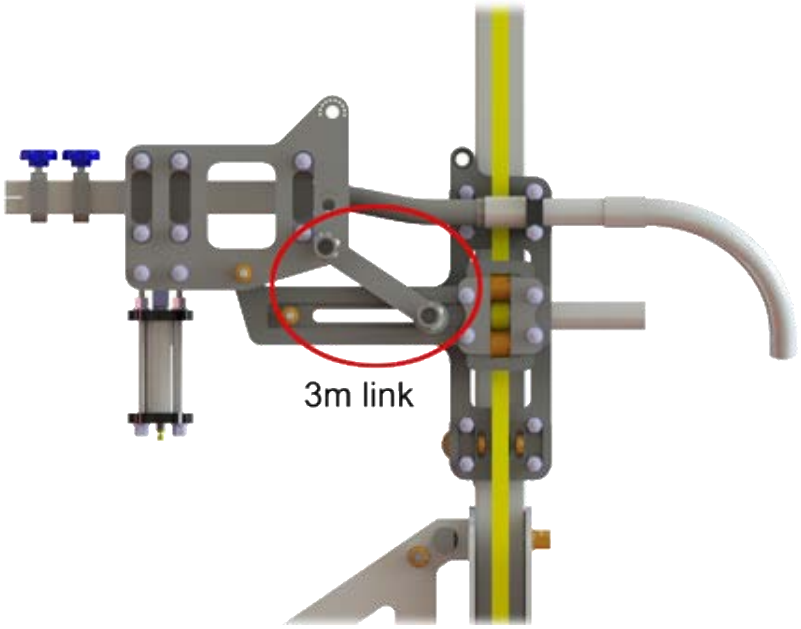
- 3m link: 3 holes
- 5m links: 5 holes
- 10m links: 10 holes

The carrier is marked with a corresponding pattern of holes indicating the correct installation location for each.



To install a boresight link, match the hole pattern on the link with the hole pattern on the carrier, remove the cam pin, bushings, and knobs, install the link, and then replace pin, bushings, and knobs.

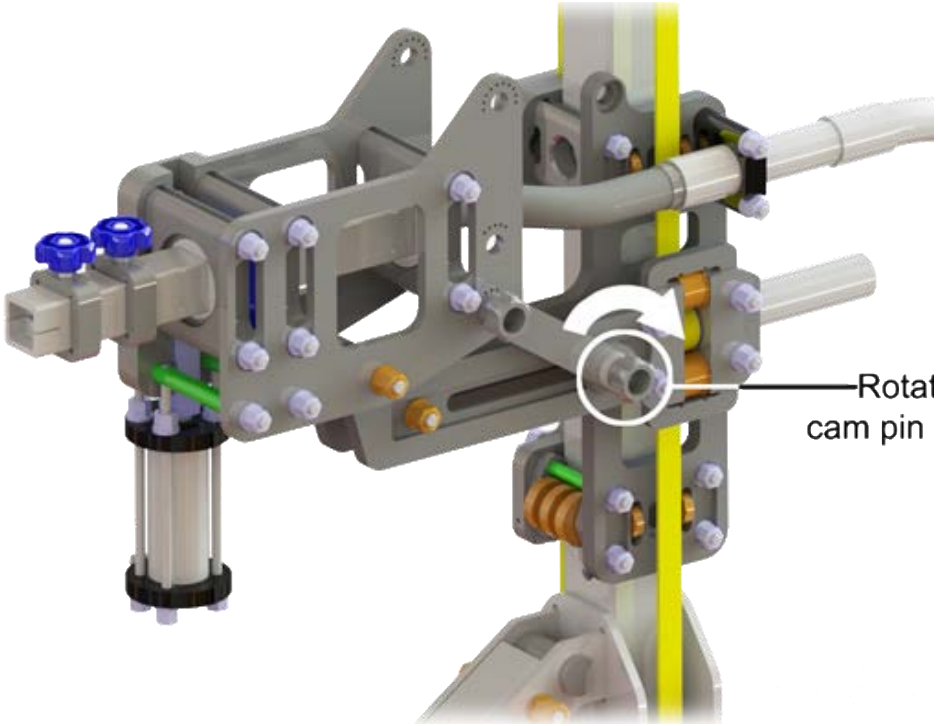
To install a set of links, make sure to install the left link on the left side of the carrier and the right link on the right side; see page 46 for more information.



The hole patterns on the carrier match the hole patterns on the links

LEVEL CARRIER

Place a level gauge on the carrier boom, rotate the cam pin knob until the carrier is level, and then re-tighten the knob. Do not overtighten.



Install Non-Boresight Links and Level Carrier (2171B Only)

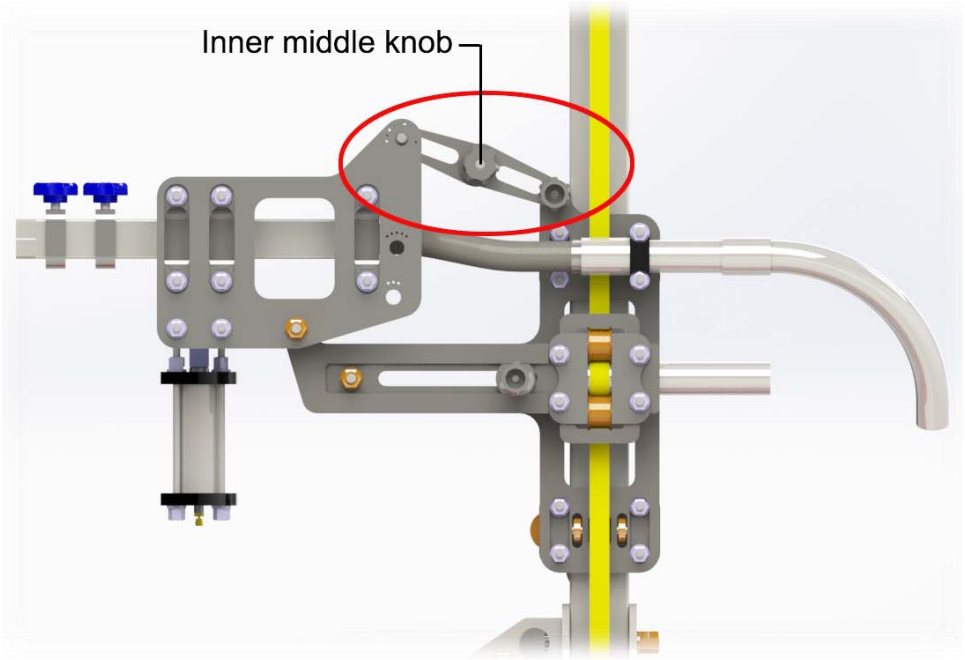
CAUTION: Never operate the Model 2171B with boresight and non-boresight links installed at the same time.

INSTALL NON-BORESIGHT LINKS

If installed, remove boresight links.

Install non-boresight links in the non-boresight locations on the carrier.

To adjust the horizontal level up or down, loosen the inner middle knob and then rotate the outer middle knob. Retighten inner knob to set



LEVEL CARRIER

Place a level gauge on the mounting section of the carrier. Tighten all knobs on the non-boresight links. Do not overtighten.

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7.0 Operation

CAUTION: Before placing into operation, follow the safety information in the ETS-Lindgren *Product Information Bulletin* included with your shipment.

This equipment should be installed, operated, and maintained by qualified personnel.

Stay clear of all moving components on this equipment.

Never stand beneath the carrier, whether moving or stationary.

Note: The stationary cam link assembly should never be attached to the carrier when using the boresight.

Pre-Operational Checklist

- ☐ Verify that the power lines are connected for the tower, controller, and any other equipment to be used for testing.
- ☐ Verify the fiber optic cables are connected.
- ☐ Verify the antenna connected to the boom is securely mounted.
- ☐ Connect the feed cable to the antenna.
- ☐ Before moving the carrier on the mast up or down, verify there are no people standing near the boom.

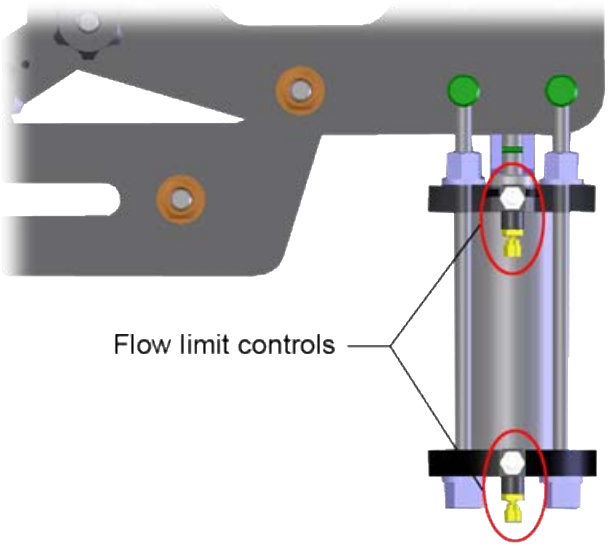
Air Polarization Operation

CAUTION: Prior to using air polarization, make sure that when the antenna polarizes that it turns freely, avoiding contact with anything (the base, the floor, and so on).

The flow limit controls located on the air cylinder are set at the factory. Use the flow limit controls to change the speed.

If polarization is operating at an excessive speed, the antenna mounted to the boom could incur damage.

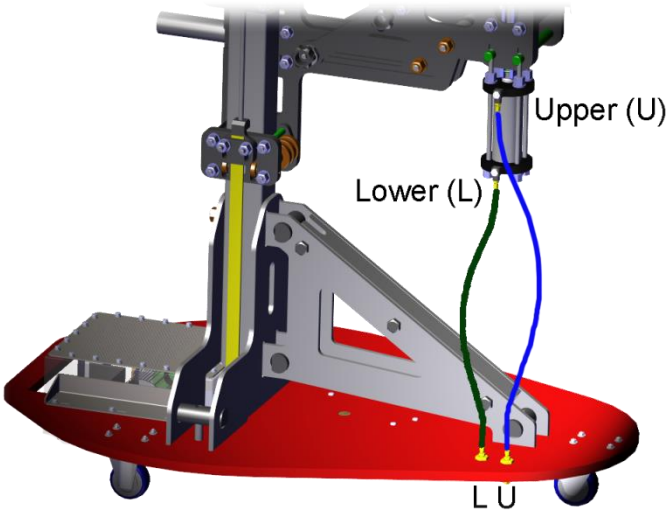
The automated air polarization assembly includes variable speed polarization cycling using flow limit controls. The air cylinder is made of non-conductive material and will polarize the largest antenna recommended for the tower. The polarization speed range is 3 degrees to 30 degrees per second.

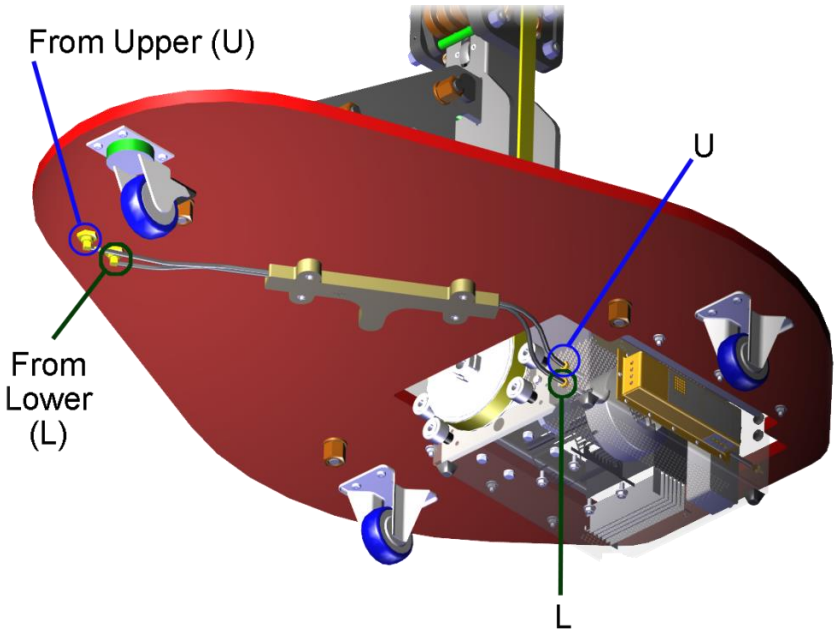


A regulated air supply of 4.0 bar to 5.5 bar (60 psi to 80 psi) is needed for this feature. It is important to have clean and dry air; so we recommend the use of a 40 micron filter in close proximity to the motor base.

Ten meters of UV stabilized air hose is included as well as a 1/8 inch NPT fitting. A metric fitting for a 4 mm tube may be supplied by the customer.

CONNECTING AIR LINES





1. **Upper air line—**Attach an air hose from the upper flow limit control on the air cylinder to the right air line connector on the base.

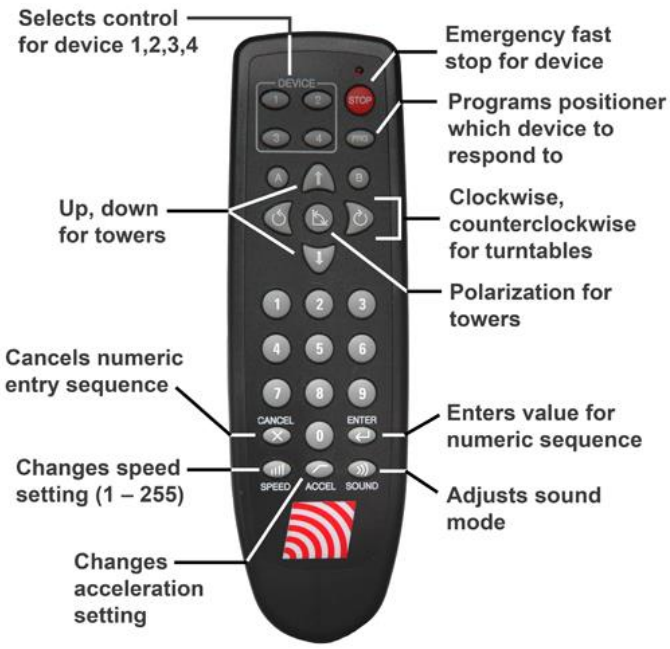
   Attach one end of another air hose to the upper air hose connector on the underside of the base. Attach the other end to the upper air hose barb on the motor base.

2. **Lower air line—**Attach an air hose from the lower flow limit control on the air cylinder to the left air line connector on the base.

   Attach one end of another air hose to the lower air hose connector on the underside of the base. Attach the other end to the lower air hose barb on the motor base.

Infrared Remote Controller

The Model 2171B/2170B Antenna Positioning Tower is infrared compatible, and can be used with a universal remote control programmed to a specific protocol, such as the ETS-Lindgren Infrared (IR) Remote Controller (included).



Model 2090 Multi-Device Controller

The ETS-Lindgren EMCenter™ Modular RF Platform (with EMControl™ Positioner Controller Plug-In Card) may be used to control the Model 2171B/2170B Antenna Positioning Tower. For information on connecting and using the EMCenter, see the *EMCenter Modular RF Platform User Manual*.

Note: If you are unfamiliar with the operation of the Model 2090, see the manual included with the controller. The manual is also available for download from www.ets-lindgren.com.

The Model 2090 requires firmware revision 3.21 or higher..

With the assembly of the tower complete, the controller must be connected to the unit and power applied to both the motor base and controller. See the controller manual for information on connecting the fiber optic cable.

Use the controller to check the clockwise (CW) and counterclockwise (CCW) rotation in both directions by a few degrees. The position in degrees increases (+) in the CW direction and decreases (-) in CCW direction.

EDIT CONFIGURATION PARAMETERS

Key	Function
PARAM	To edit a configuration parameter: • Press PARAM key to display the current parameter. • Press PARAM key repeatedly to scroll through the parameter list, displaying each parameter.
STEP (INC/DEC)	To scroll up or down the parameter list while viewing a parameter. Reduces the effort necessary to scan through a long parameter list using the PARAM key.
LIMIT/POSITION	Press any of the LIMIT/POSITION selection keys to return the display to that selection. Press any of the remaining motion keys to return the display to the current position and execute that motion. Press the PARAM key again to return to the last displayed parameter in the list, allowing easy transition between parameter adjustment and device operation.
INCRM, DECRM, or ENTER	Once the desired limit, position, or parameter is visible in the display window, press INCRM, DECRM, or ENTER to toggle into edit mode. The lowest adjustable digit will flash on and off.
LOCAL	Press the LOCAL key for that device to switch the flashing digit to the next higher digit. In this way, it is possible to rapidly adjust any digit of a multi-digit parameter or limit.

TOWER ENCODER CALIBRATION

Note: Parameter **C** must be set to **2000** for the Model 2171B/2170B.

Parameter **C**, the encoder calibration parameter, is the setting that converts the encoder count values returned from a motor base into the corresponding centimeter or degree position reading. For towers, this represents the number of encoder counts per meter. This parameter allows a variety of standard, retrofit, and custom devices to be used.

If the given value does not work correctly, the encoder calibration value can be determined using the following procedure:

1. Set the encoder calibration value to 1000.
2. Make sure the tower is positioned to allow at least one meter of travel in the upward direction at an easily measurable height, and then set the current position reading to **000.0**. To allow this, you must adjust the lower limit setting.
3. Use the STEP keys to adjust the height of the carrier until it is one meter above the start point.
4. Record the reading of the display, ignoring the decimal point. For example, **200.0** would be **2000**. This is the encoder calibration value.

Note: If the value is below 1000, the resolution of the encoder is low and the Model 2090 will not provide 0.1-cm resolution, even though the display shows that digit. If the value is past 9999, the encoder has too many counts per meter and the controller cannot correct for it. In this case, contact ETS-Lindgren for assistance.

5. Enter the encoder calibration value and reset the limits and position information.
6. Test the tower by moving it a known distance and comparing the display to the measured distance traveled. It may be necessary to adjust the encoder calibration value up or down slightly depending on the result.

START-UP

After completing the pre-operational checks, turn on the Model 2090 by pressing the power button.

SHUTDOWN

Move the carrier to an accessible height to remove the antenna and confirm the unit has come to a complete stop. Press the power button on the Model 2090 to turn it off.

Mounting Antennas

The Model 2171B/2170B accepts antennas with the following mount types:

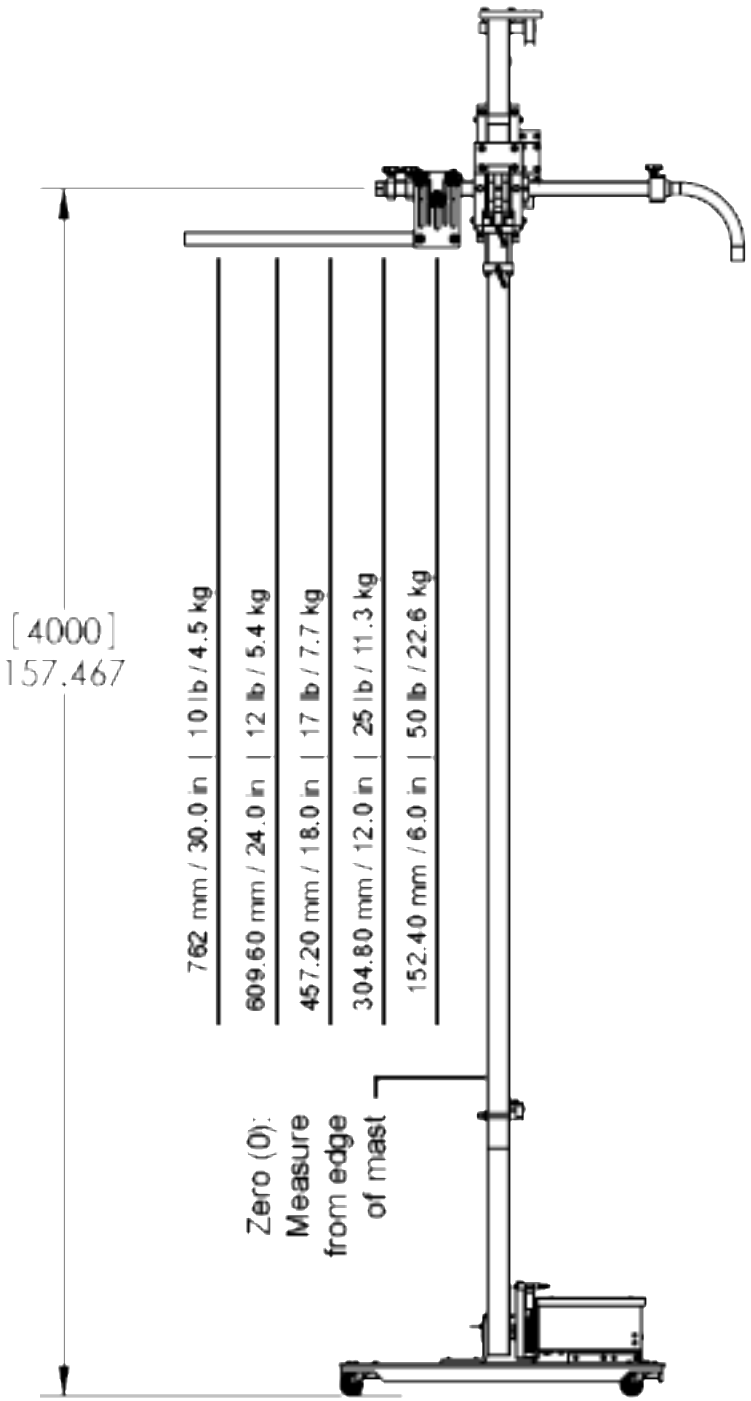
- Stinger-mount boom: Stinger-mount
- Optional offset boom: 7/8–14 thread, 1/4–20 thread

These mount types will maintain the centerline axis during polarization. The antenna should be mounted on the boom as close to the carrier as possible.

Insert the mounting knobs through the holes on the boom and align the mounting holes on the antenna with the threaded end of the mounting knobs. Secure the antenna in place by tightening the threaded knobs into the receptacle mounting holes on the antenna.

BOOM LOAD LIMITATIONS

Note: Boom loading at 25 ft lb (33.9 Nm) measured along the boom from the mast.



Appendix A: Warranty

Note: See the *Product Information Bulletin* included with your shipment for the complete ETS-Lindgren warranty for your Model 2171B/2170B Antenna Positioning Tower.

DURATION OF WARRANTIES FOR MODEL 2171B/2170B

All product warranties, except the warranty of title, and all remedies for warranty failures are limited to two years.

Product Warranted	Duration of Warranty Period
Model 2171B/2170B Antenna Positioning Tower	2 Years

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Appendix B: EC Declaration of Conformity

ETS-LINDGREN
An ESCO Technologies Company

CE 05

Declaration of Conformity

We, ETS-Lindgren, L.P., 1301 Arrow Point Drive, Cedar Park, TX, 78613, USA, declare under sole responsibility that the:

Model/Part Number: 2175 / 2070B / 2071B / 2170B / 2171B

Model/Part Name: 2175 / 2070B / 2071B / 2170B / 2171B Antenna Mast with 2175 style motor base

Date of Declaration: 01 May, 2005 **Revised Date: 13 December, 2013**

to which this declaration relates, meets the requirements and is in conformity with the relevant EC Directives listed below using the relevant section(s) of the following EC harmonized standards and other normative documents;

Applicable Directive(s):

Low Voltage Directive (LVD), 73/23/EEC and its amending directives

Electomagnetic Compatibility Directive (EMC), 2004/108/EC and its amending directives

Applicable harmonized standard(s) and/or normative document(s):

EN 55011: Electromagnetic emissions requirements for Industrial, Scientific and Medical (ISM) Equipment

EN 61000-4-11:1994 Electromagnetic compatibility Part 4, Testing and measurement techniques section 11: Voltage dips, short interruptions and voltage variations immunity tests

EN 61000-4-2:1995 Electromagnetic compatibility (EMC) -- Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

EN 61000-4-3:1997 Electomagnetic compatibility for Electrical and Electronic Equipment, Part 3: Immunity to radiated, radio frequency, electromagnetic fields

EN 61000-4-4:1995 Electromagnetic compatibility for industrial process measurement and control equipment, Part 4: Elecrtrical fast transient/burst requirements

EN 61000-4-5:1995 Electomagnetic compatibility for electrical and electronic equipment, Part 5: Surge immunity requirements

EN 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use

ENV 50204:1996 Radiated electromagnetic fields from digital radio telephones - Immunity test

Authorized Signatories:

ETS-Lindgren, L.P.
Bryan Sayler, General Manager

ETS-Lindgren L.P.
James C. Psencik, Vice President of Engineering

The authorizing signatures on this Declaration of Conformity document authorizes ETS-Lindgren, L.P. to affix the CE mark to the indicated product. CE marks placed on these products will be distinct and visible. Other marks or inscriptions liable to be mistaken with the CE mark will not be affixed to these products.

ETS-Lindgren, L.P. has ensured that technical documentation shall remain available on premises for inspection and validation purposes for a period ending at least 10 years after the last product has been manufactured.

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Appendix C: Drawings

The following drawings are located in the pocket of the back cover of the manual:

118100: Model 2171B Carrier Assembly (2 Pages)

- **page 1:** Boresight Option shown
- **page 2:** Non-Boresight Option shown

118200: Model 2171B Tower Assembly (2 pages)

- **page 1-2:** Boresight Option shown

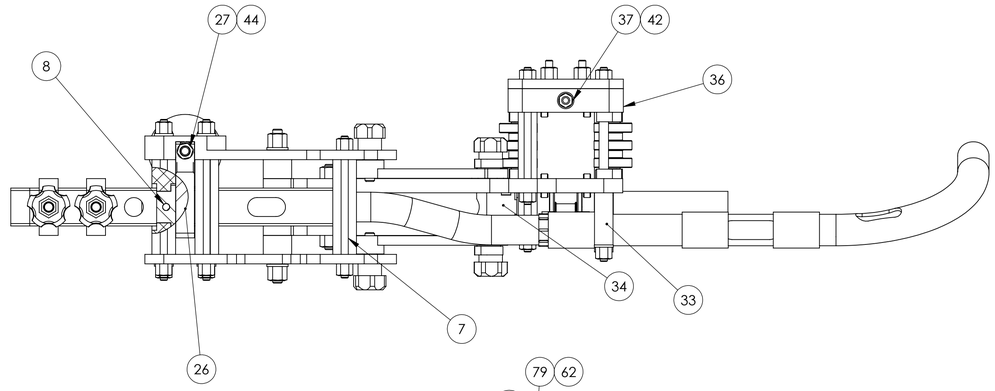
118623: Model 2170B Carrier Assembly

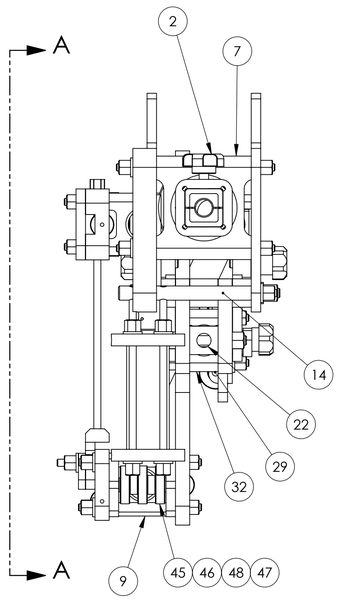
118624: Model 2170B Tower Assembly

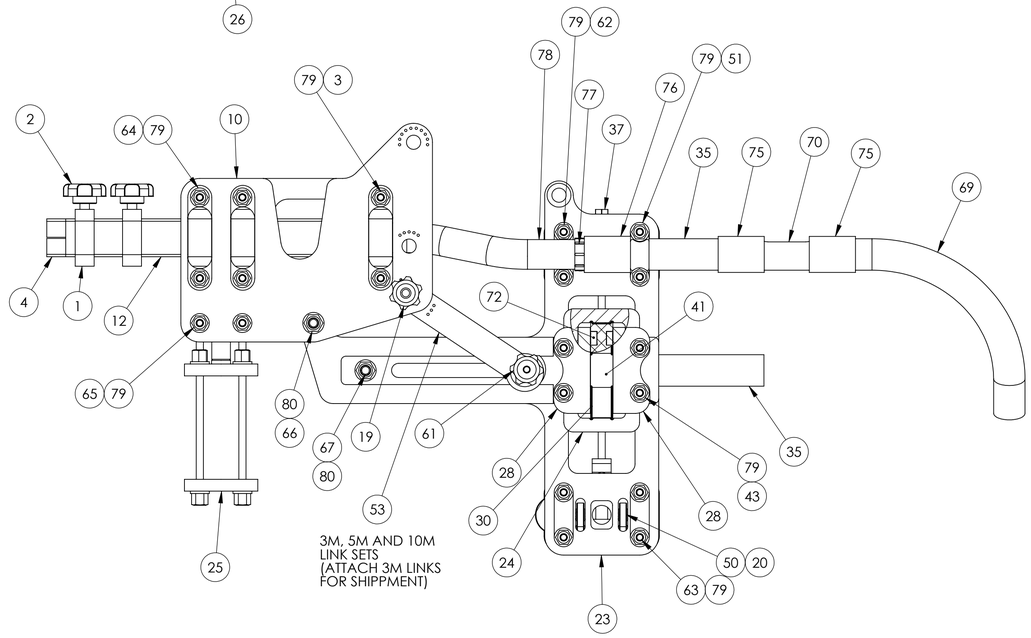
REF DRAWING

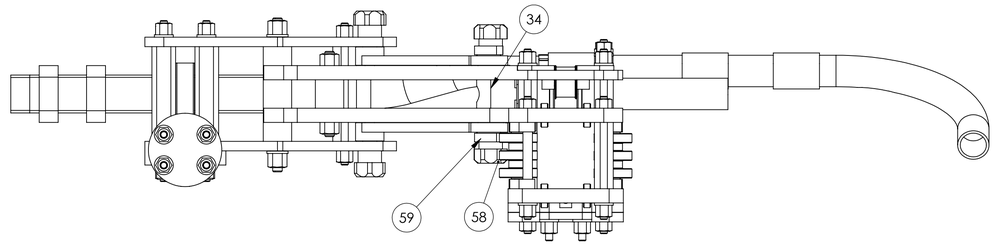
NOTE:
-BORESIGHT OPTION SHOWN

REVISIONS				
ECN	REV	DESCRIPTION	DATE	APPROVED
	H	**ADDED 5M AND 10M LINKS**	**06/03/14**	JSW









ITEM#	PART NUMBER	DESCRIPTION	118100 /QTY.
80	910827	NUT,1/2-13,HEX,FG,BROWN	4
79	910826	NUT,3/8-16,HEX,FG,BROWN	40
78	891539	HOSE,1-1/4" VACUUM	1.5
77	891538	BARB,HOSE,1-1/4" NPT,MALE	1
76	891537	ADAPTER,1-1/4" NPT,FEMALE	1
75	891535	COUPLING,GRAY,1-1/4" PVC	2
74	891533	SNAP RING,30MM SHAFT	2
73	891251	STUD,1"-8 X 12 NYLATRON GS	1
72	880459	BEARING,3/8"ID X 7/8"OD	6
71	880458	BEARING,30MM ID X 37MM OD	4
70	20747	CONDUIT,1-1/4" GRAY PVC	1
69	20746	ELBOW,GRAY,1-1/4" PVC,SLOT	1
68	20259	PLATE,BELT CLAMP W/ STUD	1
67	19922	STUD,1/2-13 X 4.50,FG	1
66	19921	STUD,1/2-13 X 8.13,FG	1
65	19920	STUD,3/8-16 X 2.13,FG	2
64	19959	STUD,3/8-16 X 8.38,FG	4
63	19957	STUD,3/8-16 X 6.50,FG	4
62	19954	STUD,3/8-16 X 2.25,FG	2
61	19937	KNOB,GLUED CAM,2171B	1
60	19934	BUSHING,SLIDER ACTUATOR	2
59	19933	ECCENTRIC CAM,STYLE 3,2171B	1
58	19932	KNOB,CAM,2171B	1
57	19666	LINK,CAM 10M,STYLE 3,RH,2171B	1
56	19965	LINK,CAM,5M,STYLE 3,RH,2171B	1
55	19614	LINK,10M,2171B	1
54	19613	LINK,5M,2171B	1
53	19612	LINK,CAM 3M,STYLE 3,2171B	2
52	19558	DOWEL,3/8 X 1.90,G10	1
51	18659	STUD,3/8-16 X 10.25,FG	2
50	18519	ROLLER,MAST,2171B	8
49	18518	CLAMP,BELT,2171B	1
48	18494	DOWEL,3/8 X 3.45,G10	2
47	18493	STANDOFF,3/8 X 2-1/2,G10	4
46	18492	BRKT,ROLLER,2171B	4
45	18491	ROLLER,CARRIER,2171B	2
44	18147	STUD,1/2-13 X 9.75,FG	1
43	18144	STUD,3/8-16 X 4.50,FG	4
42	18142	STUD,3/8-16 X 13.87,FG	1
41	18092	SPROCKET ASSY,B/S	1
40	18091	SPACER,THRUST,B/S	2
39	18085	PLATE,BODY,CLAMP	1
38	18084	BODY,CLAMP,BELT	1
37	18083	NUT,TENSION,BELT	1
36	18081	BLOCK,BELT CLAMP	1
35	18078	PIPE,CUT,1.25 X 6.87,GRAY PVC	2
34	18076	ACTUATOR,118076	1
33	18073	BLOCK,COAX SUPPORT	1
32	18071	PILLOW BLOCK,LONG,B/S	2
31	18070	DOWEL,1/8 X .75,G10	3
30	18069	IDLER,B/S	2
29	18068	DOWEL,3/8 X 2.50,G10	2
28	18066	BRACKET,IDLER,B/S	2
27	18065	NUT,RACK,POLAR	1
26	18064	GEAR,POLAR,2171B	1
25	18063	CYLINDER,POLAR,2171B	1
24	18062	PLATE,MAST,OUTER	1
23	18061	PLATE,MAST,INNER	1
22	18060	BLOCK,SUPPORT,MAST PLATES	1
21	18059	KNOB,GLUED CAM,LOCK	1
20	18058	DOWEL,3/16 X 1.45,G10	8
19	18057	KNOB,GLUED,1/2" LINK	2
8	18052	CAM,KNOB,NB	1
7	18051	LINK,NB,1"	1
6	18050	LINK,NB,1-1/2"	1
5	18049	DOWEL,3/8 X .63,G10	4
4	18048	ANCHOR,POLAR	2
3	18047	RACK,MACHINED,POLAR	1
2	18046	BOOM,POLAR,2171B	1
1	18045	CAM,CYLINDER,2171B	1
10	18044	CAM,BORESITE,2171B	1
9	18020	BLOCK, MAIN BEARING	2
8	18018	BEARING, POLAR BOOM	3
7	18017	BLOCK,BEARING,2171B POLAR	3
6	18016	BUSHING, PIVOT	1
5	18015	BUSHING #2, PIVOT	2
4	13493	ASSY,BUSHING,6.0" STINGER	1
3	09572	STUD,3/8-16 X 7.50,FG	2
2	09034	KNOB,1/2-13 X 1.1,GLUED	2
1	08990	CLAMP,STINGER	2

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
SURFACE FINISH 63 RMS OR BETTER
TOLERANCES ARE:
DECIMALS: X.XX ± .015; X.XXX ± .005
ANGLES: ± .5

FINISH: NONE

	INITIAL	DATE
DRAFTING	JAD	04-19-12
ENGINEERING	SRK	04/2012

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An ESCO Technologies Company

TITLE

CARRIER,B/S,2171B

PROPRIETARY INFORMATION
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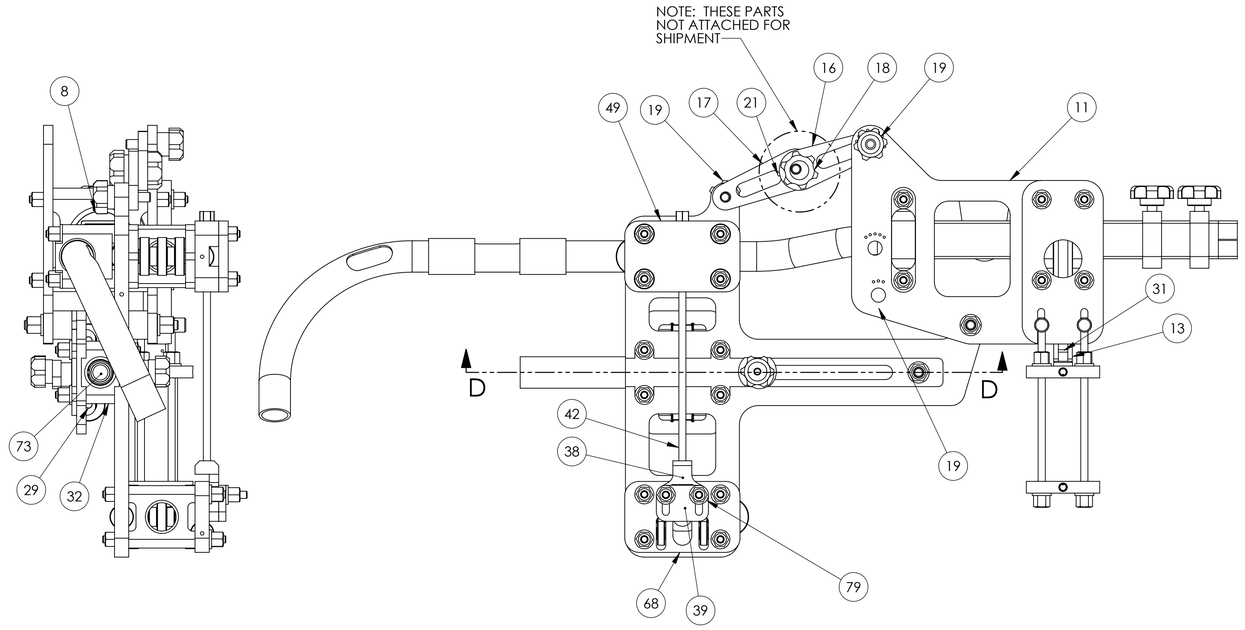
SIZE	SCALE	DWG. NO.	REV.
D	1:4	118100	H

DO NOT SCALE DRAWING

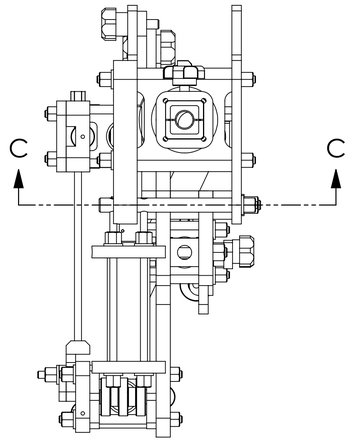
SHEET 1 OF 2

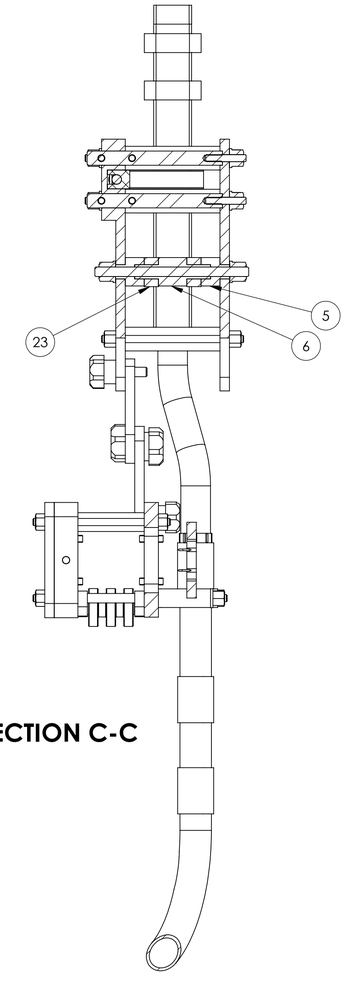
REF DRAWING

NOTE:
-NON-BORESIGHT OPTION SHOWN

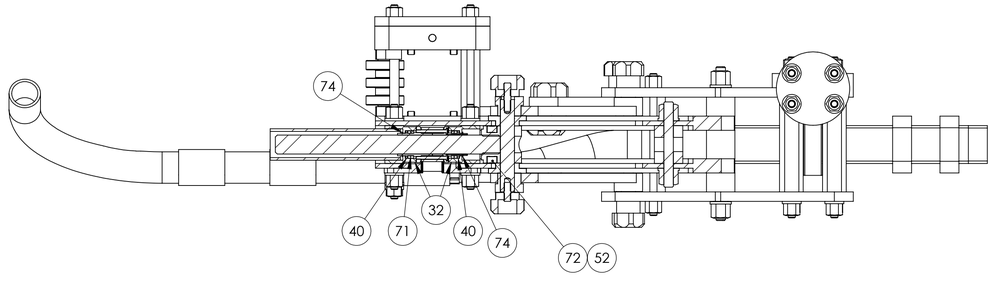


VIEW A-A





SECTION C-C



SECTION D-D

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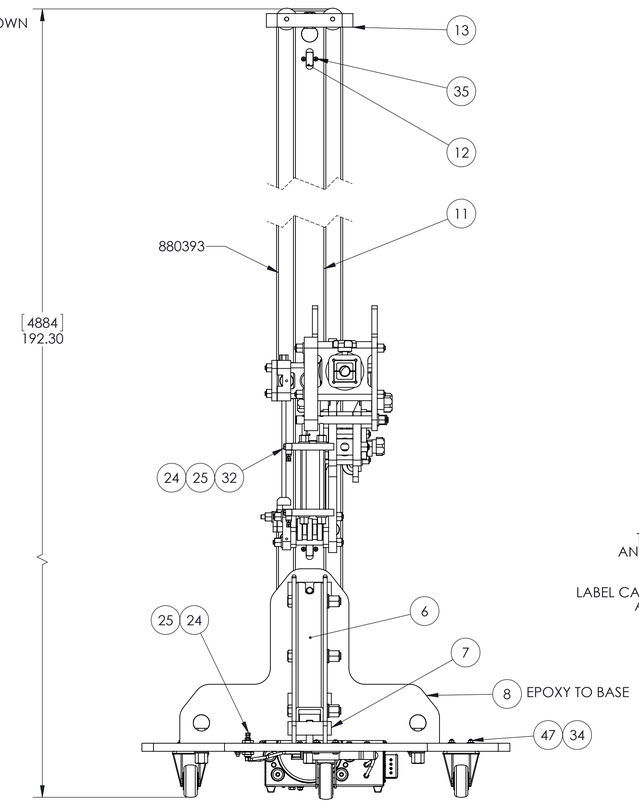
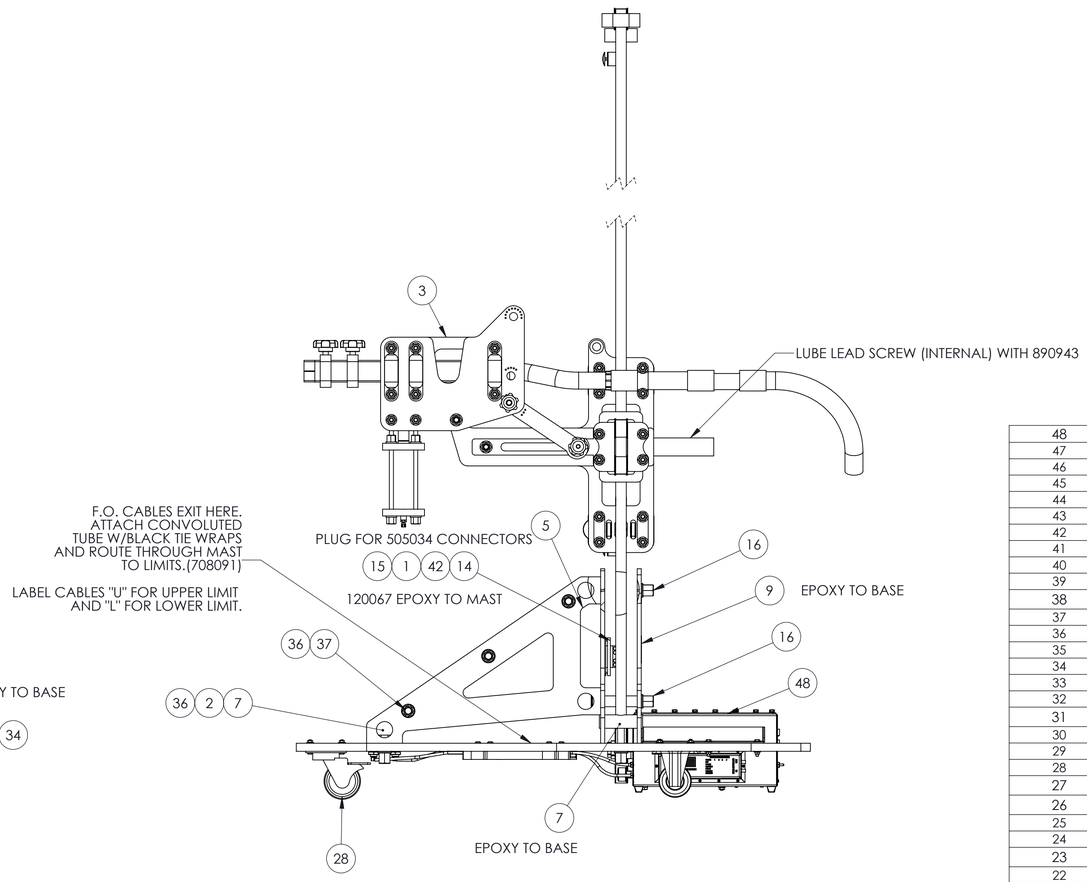
SIZE	SCALE	DWG. NO.	REV.
D	1:4	118100	H
DO NOT SCALE DRAWING		SHEET 2 OF 2	

REF DRAWING

NOTE:
-BORESIGHT OPTION SHOWN
-NON-BORESIGHT OPTION NOT SHOWN
-SEE 118100 FOR DETAILS





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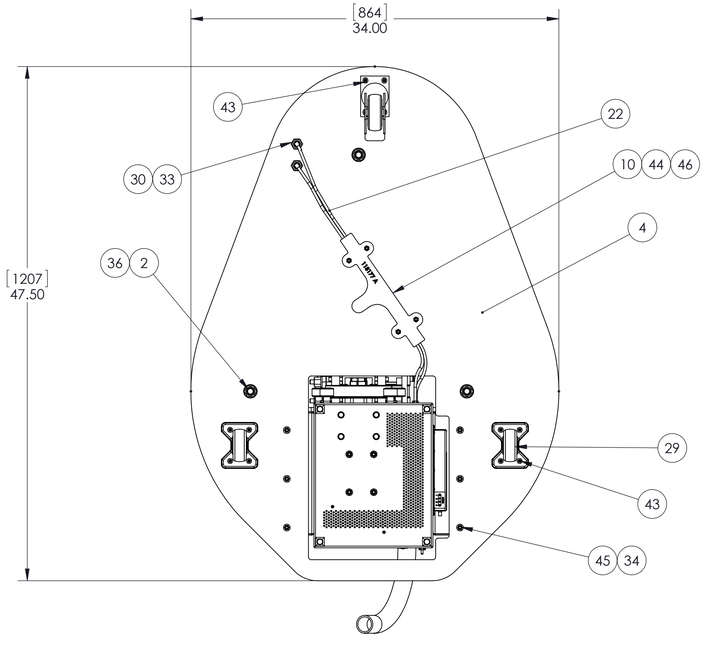

REVISIONS				
ECN	REV	DESCRIPTION	DATE	APPROVED
	F	CHNG FIBER OPTICS	09/26/14	JRC

ITEM NO.	PART NUMBER	DESCRIPTION	118200/QTY.
48	118166	ASSY,2171B MOTORBASE	1
47	930688	NUT,M6,HEX,SS,NYLOK	14
46	930681	NUT,M6,HEX,SS	8
45	930665	BOLT,M6 X 35,HEX,SS	6
44	930663	SCREW,M6 X 35,PHIL,PAN,SS	4
43	930662	SCREW,M6 X 30,PHIL,PAN,SS	12
42	930341	SCREW,M3 X 12MM,PHIL,FLAT,SS	4
41	920825	LABEL,PINCH POINT,INTL SYMBOL	1
40	920824	LABEL,HAND CRUSH,INTL SYMBOL	1
39	920820	LABEL,2171B LOGO	1
38	920001	EPOXY KIT 2-PART RESIN T-88	.1
37	911204	BOLT,5/8-11 X 4.5",HEX,GF NYLON,BLACK	3
36	910899	NUT,5/8-11,FG,BROWN	6
35	910686	SCREW,10-32 X 1/2,PHIL,FLAT,SS	4
34	910455	WASHER,1/4,FLAT,SS	24
33	905194	COUPLING,BULKHEAD,1/8 NPT	2
32	905093	FLOW CONTROL,RT ANG,1/8 NPT	2
31	890983	SLEEVING,SLIT-CONVOLUTED,PE,1/4" ID	20
30	890950	FITTING,TUBE,1/8 NPT TO .17 ID,RT ANGLE	2
29	890949	CASTER,3" RIGID,250 LB	2
28	890948	CASTER,3" SWIVEL W/BRAKE,250 LB	1
27	890947	HOSE,TWIN 1/8 ID X 1/4 OD,COILED,20 FT	1
26	890943	GREASE,SILICONE,O-RING LUBE	.1
25	890465	BARB HOSE 11924-1 CLIPPARD	4
24	890464	NUT TUBE 5000-2 CLIPPARD	4
23	880393	BELT,TIMING,T10,25MM,ESD	33
22	860140	NYLON TUBING,.250 OD X .170 ID,BLACK	33
21	708093	FIBER OPTIC CABLE LIMIT SWITCH 0.5M	2
20	708092	FIBER OPTIC CABLE LIMIT SWITCH 4.75M	2
19	708091	FIBER OPTIC CABLE 1M POF - POF SIMPLEX	4
18	505034	CONNECTOR HFBR-4501 HEWLETT PACK	4
17	121162	2171B SHIPPING MAST	1
16	120161	MAST BOLT,GLUED	2
15	120067	FIBER OPTIC PLUG PLATE,MAST,2171B	1
14	119970	FIBER OPTIC PLUG,MAST,2171B	1
13	118181	ASSY.,PULLEY BLOCK,2171B	1
12	118179	SWITCH,LIMIT,F.O.,.25 WT	2
11	118178	MAST,2171B	1
10	118177	PROTECTOR,F.O. AND AIR,2171B	1
9	118176	GUSSET,REAR,2171B	1
8	118175	GUSSET,FORWARD,2171B	1
7	118174	NUT,GUSSET,2171B	5
6	118173	TUBE,BRACE,2171B	1
5	118172	BRACE,FORWARD,2171B	2
4	118171	BASE,2171B	1
3	118100	CARRIER,B/S,2171B	1
2	109282	STUD,5/8-11 X 4.00,FG	3
1	109250	LOCK,MOLDED,F.O. CABLE	4

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
SURFACE FINISH 63 RMS OR BETTER
TOLERANCES ARE:
DECIMALS: X.XX ± .015; X.XXX ± .005
ANGLES: ± .5

FINISH: NONE

	INITIAL	DATE
DRAFTING	JAD	04-24-12
ENGINEERING	SRK	

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TITLE: TOWER ASSY,2171B

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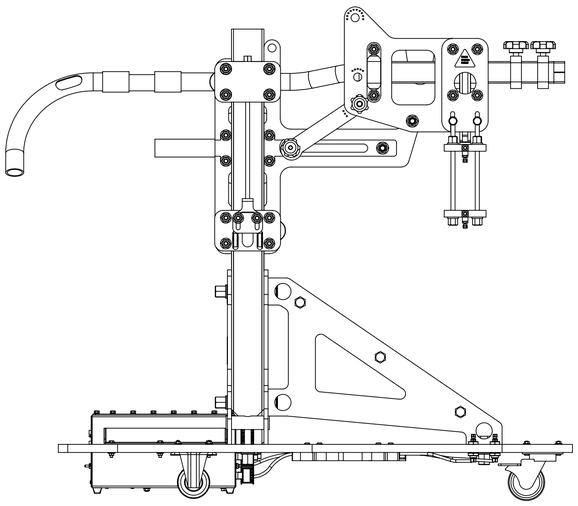
SIZE	SCALE	DWG. NO.	REV.
D	1:7	118200	F

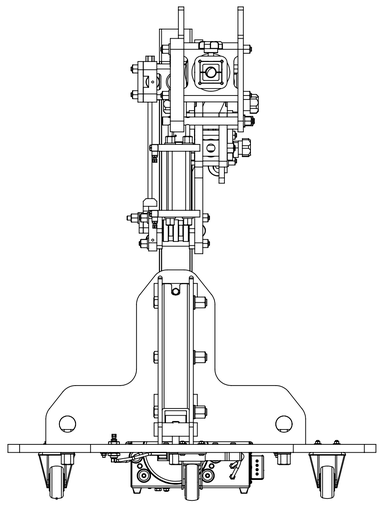
DO NOT SCALE DRAWING

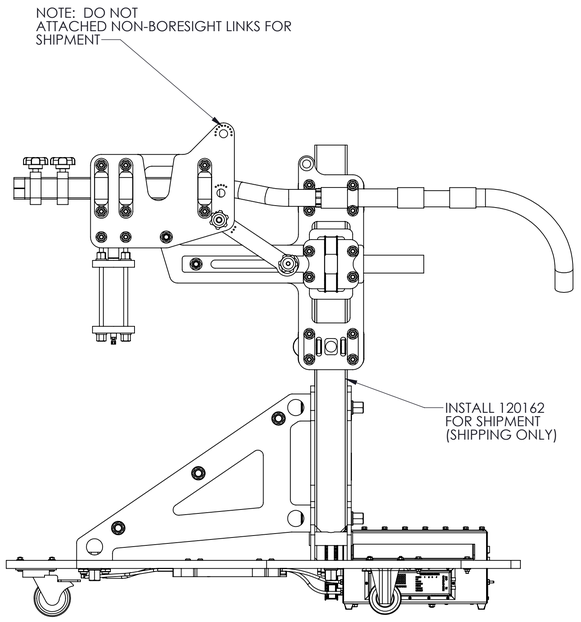
SHEET 1 OF 2

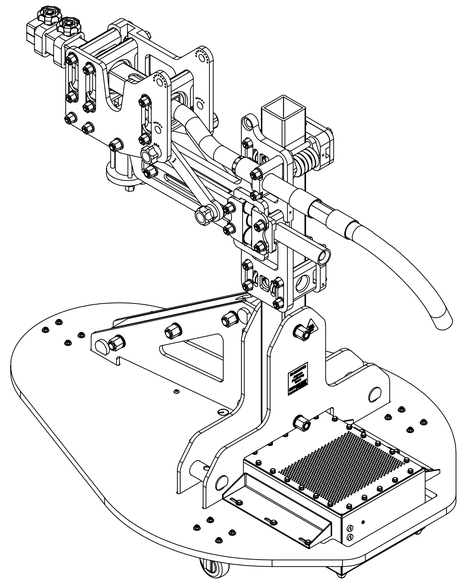
REF DRAWING

REFERENCE FOR SHIPPING ONLY









THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
SURFACE FINISH 63 RMS OR BETTER
TOLERANCES ARE:

DECIMALS	ANGLES
X.XX ± .015	± .5
X.XXX ± .005	

FINISH: NONE

	INITIAL	DATE
DRAFTING	JAD	04-24-12
ENGINEERING	SRK	

ETS•LINDGREN™
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TITLE: TOWER ASSY,2171B

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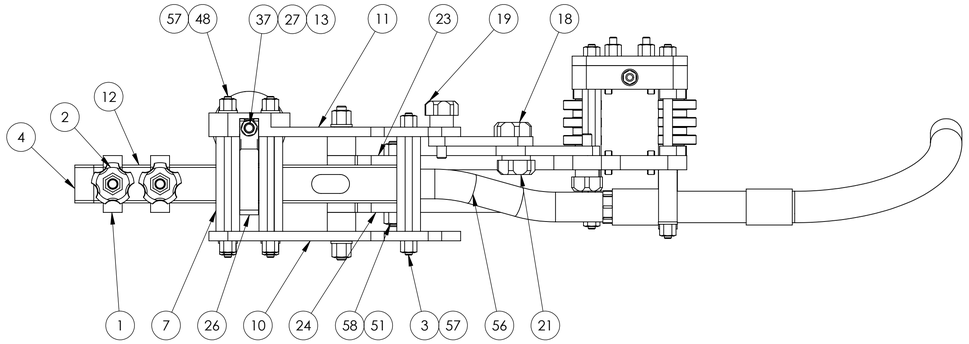
SIZE	SCALE	DWG. NO.	REV.
D	1:7	118200	E

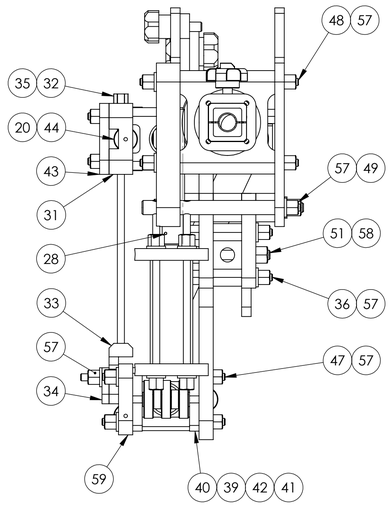
DO NOT SCALE DRAWING

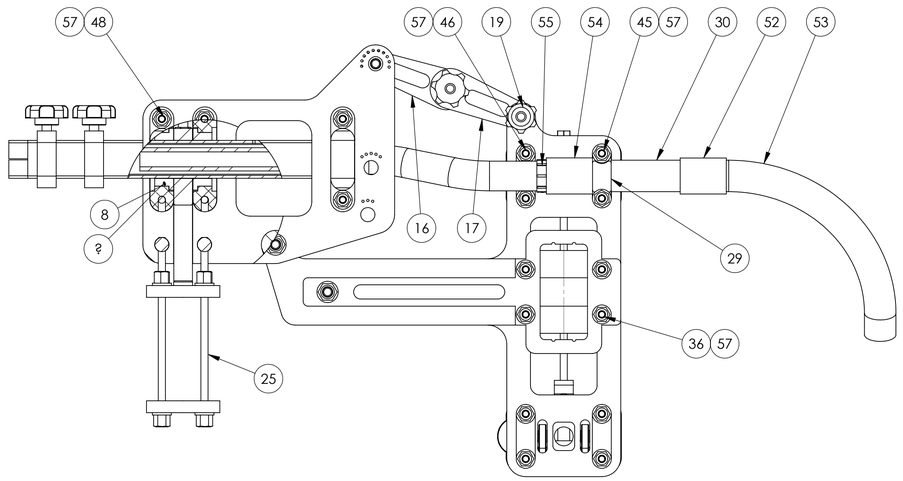
SHEET 2 OF 2

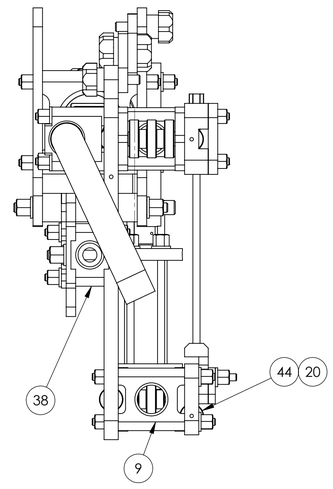
REF DRAWING

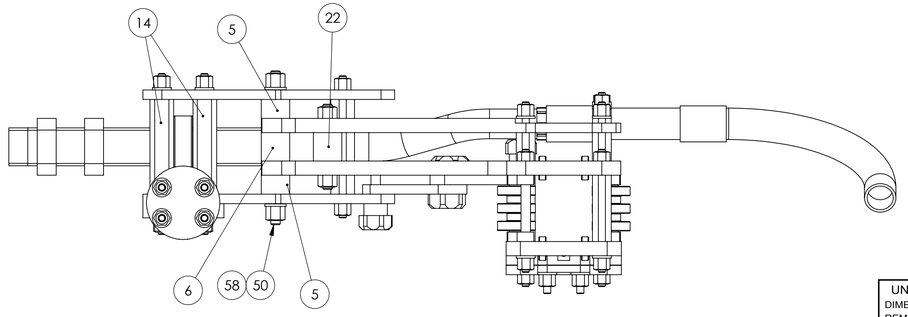
REVISIONS				
ECN	REV	DESCRIPTION	DATE	APPROVED
	A	ADDED 120252	12/09/13	JRC











ITEM NO.	PART NUMBER	DESCRIPTION	QTY
59	120252	PLATE,BELT CLAMP,W/ STUD	1
58	910827	NUT,1/2-13,HEX,FG,BROWN	4
57	910826	NUT,3/8-16,HEX,FG,BROWN	40
56	891539	HOSE,1-1/4" VACUUM	1
55	891538	BARB,HOSE,1-1/4" NPT MALE	1
54	891537	ADAPTER,1-1/4" NPT FEMALE	1
53	891536	ELBOW,GRAY,1-1/4" PVC	1
52	891535	COUPLING,GRAY,1-1/4" PVC	1
51	119962	STUD,1/2-13 X 4.50,FG	1
50	119961	STUD,1/2-13 X 8.13,FG	1
49	119960	STUD,3/8-16 X 2.13,FG	2
48	119959	STUD,3/8-16 X 8.38,FG	4
47	119957	STUD,3/8-16 X 6.50,FG	4
46	119956	STUD,3/8-16 X 7.25,FG	2
45	118632	STUD,3/8-16 X 10.25,FG	2
44	118519	ROLLER,MAST,2171B	8
43	118518	CLAMP,BELT,2171B	1
42	118494	DOWEL,3/8 X 3.45,G10	2
41	118493	STANDOFF,3/8 X 2-1/2,G10	4
40	118492	BRKT.,ROLLER,2171B	4
39	118491	ROLLER,CARRIER,2171B	2
38	118284	PLATE,CARRIER,2171,NON-BS	2
37	118147	STUD,1/2-13 X 9.5,FG	1
36	118144	STUD,3/8-16 X 4.50,FG	4
35	118142	STUD,3/8-16 X 13.87,FG	1
34	118085	PLATE,BODY,CLAMP	1
33	118084	BODY,CLAMP,BELT	1
32	118083	NUT,TENSION,BELT	1
31	118081	BLOCK,BELT CLAMP	1
30	118078	PIPE,CUT,1.25 X 6.87,GRAY PVC	1
29	118073	BLOCK,COAX SUPPORT	1
28	118070	DOWEL, 1/8 X .95 G10	3
27	118065	NUT,RACK,POLAR	1
26	118064	GEAR,POLAR,2171B	1
25	118063	CYLINDER,POLAR,2171B	1
24	118062	PLATE,MAST,OUTER	1
23	118061	PLATE,MAST,INNER	1
22	118060	BLOCK,SUPPORT,MAST PLATES	1
21	118059	KNOB,GLUED,CAM LOCK	1
20	118058	DOWEL, 3/16 X 1.45 G10	8
19	118057	KNOB,GLUED,1/2" LINK	2
18	118052	CAM KNOB,NB	1
17	118051	LINK,NB,1"	1
16	118050	LINK,NB,1-1/2"	1
15	118049	DOWEL,3/8 X .63,G10	4
14	118048	ANCHOR,POLAR	2
13	118047	RACK,MACHINED,POLAR	1
12	118046	BOOM,POLAR,2171B	1
11	118045	CAM,CYLINDER,2171B	1
10	118044	CAM,BORESITE,2171B	1
9	118020	BLOCK, MAIN BEARING	2
8	118018	BEARING, POLAR BOOM	3
7	118017	BLOCK,BEARING,2171B POLAR	3
6	118016	BUSHING, PIVOT	1
5	118015	BUSHING #2, PIVOT	2
4	113493	ASSY,BUSHING,6.0" STINGER	1
3	109572	STUD,3/8-16 X 7.50,FG	2
2	109034	KNOB,1/2-13 X 1.1,GLUED	2
1	108990	CLAMP,STINGER	2

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
SURFACE FINISH 63 RMS OR BETTER
TOLERANCES ARE:

DECIMALS	ANGLES
X.XX ± .015	± .5
X.XXX ± .005	

FINISH: NONE

	INITIAL	DATE
DRAFTING	JAD	04-19-12
ENGINEERING	SRK	09/12/12

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TITLE: CARRIER2170B

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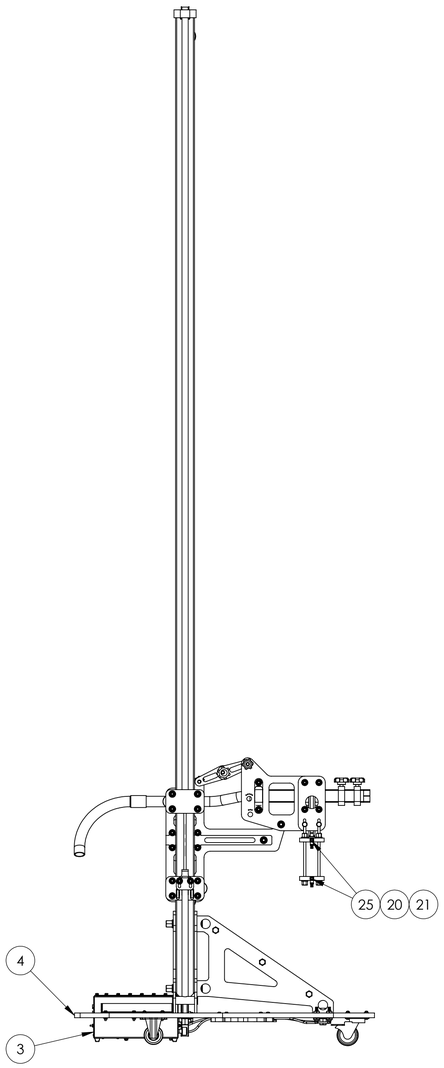
SIZE	SCALE	DWG. NO.	REV.
D	1:4	118623	A

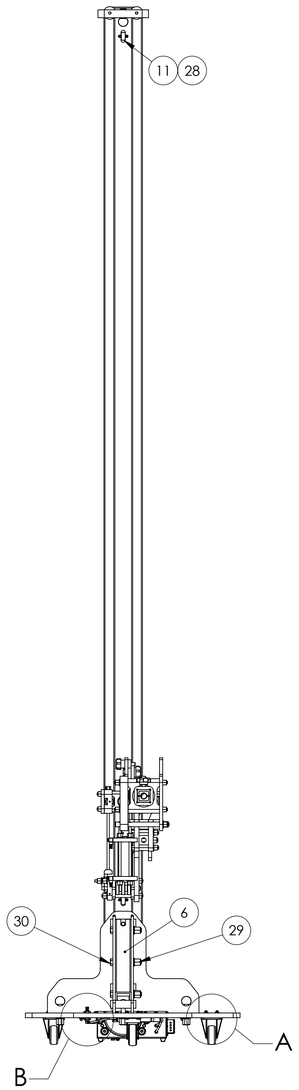
DO NOT SCALE DRAWING

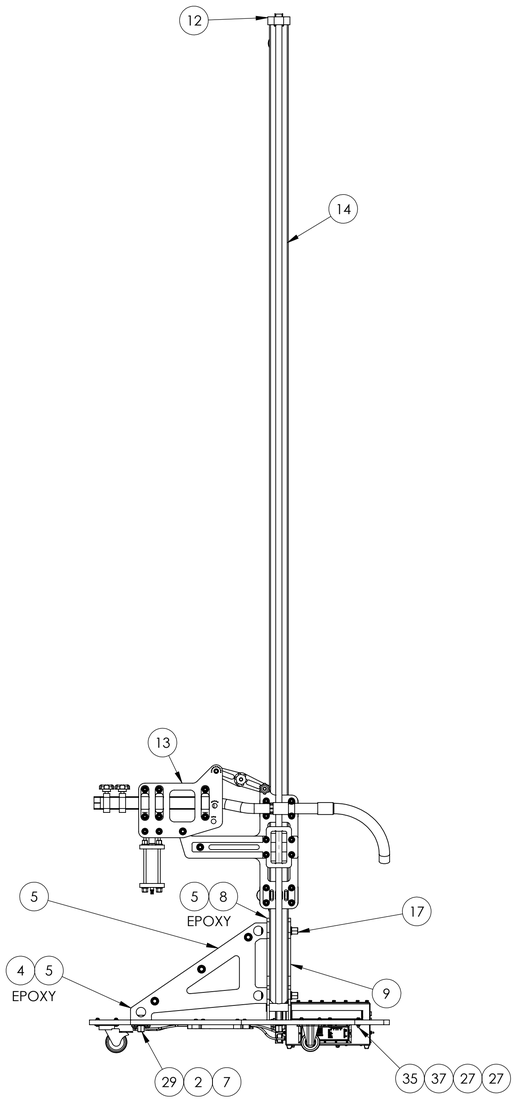
SHEET 1 OF 1

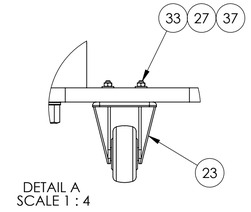
REF DRAWING

REVISIONS				
ECN	REV	DESCRIPTION	DATE	APPROVED
	A	REPLACED 118625 WITH 120265	12/09/13	JRC

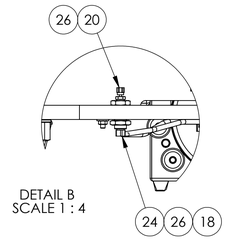




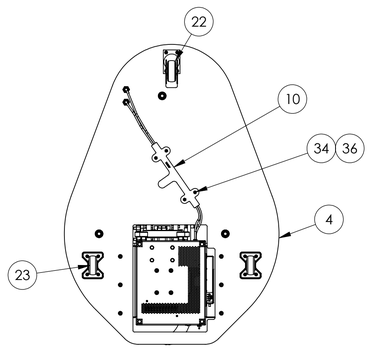




DETAIL A
SCALE 1 : 4



DETAIL B
SCALE 1 : 4



ITEM NO.	PART NUMBER	DESCRIPTION	QTY
37	930688	NUT,M6,HEX,SS,NYLOK	14
36	930681	NUT,M6,HEX,SS	8
35	930665	BOLT,M6 X 35,HEX,SS	6
34	930663	SCREW,M6 X 35,PHIL,PAN,SS	4
33	930662	SCREW,M6 X 30,PHIL,PAN,SS	12
32	930341	SCREW,M3 X 12MM,PHIL,FLAT,SS	4
31	920001	EPOXY,2-PART T88	.02
30	911204	BOLT,5/8-11 X 4.5",HEX,GF NYLON,BLACK	3
29	910899	NUT,5/8-11,FG,BROWN	6
28	910686	SCREW,10-32 X 1/2,PHIL,FLAT,SS	4
27	910455	WASHER,1/4,FLAT,SS	24
26	905194	COUPLING,BULKHEAD,1/8 NPT	2
25	905093	FLOW CONTROL,RT ANG,1/8 NPT	2
24	890950	FITTING,TUBE,1/8 NPT TO .17 ID,RT ANGLE	2
23	890949	CASTER,3" RIGID,250 LB	2
22	890948	CASTER,3" SWIVEL W/BRAKE,250 LB	1
21	890465	BARB HOSE 11924-1 CLIPPARD	4
20	890464	NUT TUBE 5000-2 CLIPPARD	4
19	880393	BELT,TIMING,T10,25MM,ESD	33
18	860140	NYLON TUBING,.250 OD X .170 ID,BLACK	33
17	120161	MAST BOLT,GLUED	2
16	120067	FIBER OPTIC PLUG PLATE,MAST,2171B	1
15	119970	FIBER OPTIC PLUG,MAST,2171B	1
14	120265	MAST,2170B	1
13	118623	CARRIER2170B	1
12	118181	ASSY.,PULLEY BLOCK,2171B	1
11	118179	SWITCH,LIMIT,F.O.,.25 WT	2
10	118177	PROTECTOR,F.O. AND AIR,2171B	1
9	118176	GUSSET,REAR,2171B	1
8	118175	GUSSET,FORWARD,2171B	1
7	118174	NUT,GUSSET,2171B	5
6	118173	TUBE,BRACE,2171B	1
5	118172	BRACE,FORWARD,2171B	2
4	118171	BASE,2171B	1
3	118166	MOTORBASE,2171	1
2	109282	STUD,5/8-11 X 4.00,FG	3
1	109250	LOCK,MOLDED,F.O. CABLE	4

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
REMOVE ALL BURRS AND SHARP EDGES
SURFACE FINISH 63 RMS OR BETTER
TOLERANCES ARE:
DECIMALS: X.XX ± .015; X.XXX ± .005
ANGLES: ± .5

	INITIAL	DATE
DRAFTING		
ENGINEERING	SRK	09/12/12

FINISH: NONE

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An ESCO Technologies Company

TITLE: TOWER ASSY,2170B

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SIZE	SCALE	DWG. NO.	REV.
D	1:12	118624	A

DO NOT SCALE DRAWING

SHEET 1 OF 1